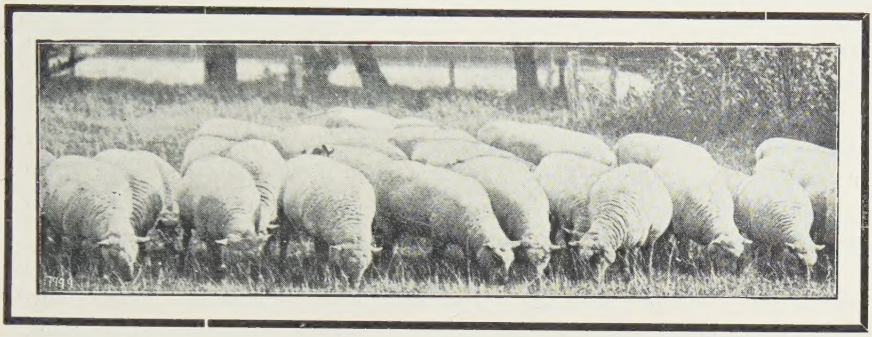

The

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WELLINGTON, N.Z., 20TH MAY, 1914.

PRICE, SIXPENCE.

FENCING.

W. HONEYBUN.

IN no other phase of farm-work does thoroughness and care in the first place pay better in the end than in fencing. Not only will the well-erected fence last better and require a minimum of attention as compared with the slovenly and hastily put-up structure, but it will be a continual source of satisfaction and pride to the owner. A badly built fence — with posts at varying heights and wires unevenly spaced — is a blot on the landscape, while the good fence with an even top line and the wires uniform throughout is a pleasure to the eye, and gives the beholder a good impression of the farm and its occupier.

These notes on the construction of the ordinary wire fence in common use in New Zealand are intended mainly for the inexperienced, and therefore the methods advised will be described in as

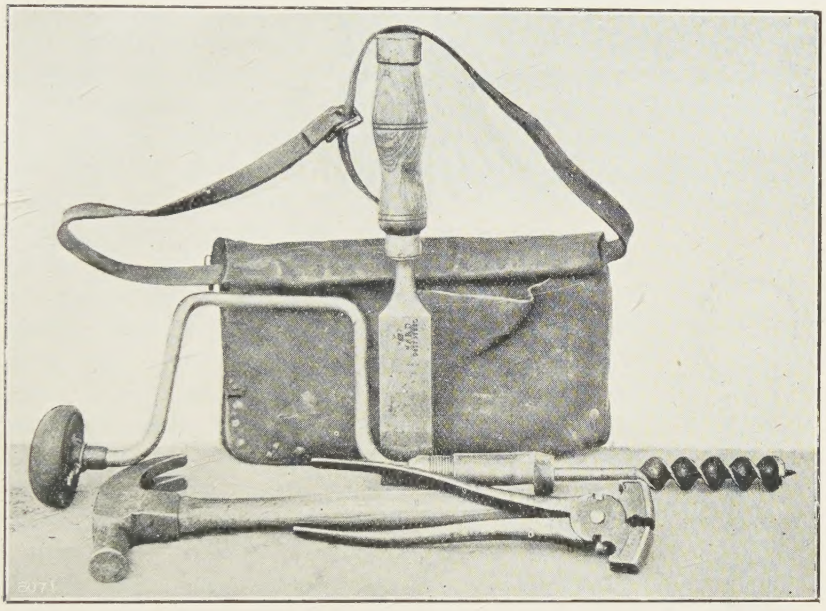
straightforward a manner as possible. If anything said does not appear to be clear enough to the reader, the writer (a member of the staff of the Ruakura Farm of Instruction) will be pleased to furnish direct a fuller explanation.

It is recognized in describing a particular style of fence that there are several kinds in use, and for each of them some claim of superiority is made. They all have their good points. The style about to be described has proved its value for the past thirty years in my experience, and can therefore be confidently recommended.

In the first place, it is poor economy to work with cheap materials. Under ordinary circumstances a well-built fence constructed of good material will last for twenty or more years, given occasional attention, whereas the fence of second-class material, built on the quick and easy principle, will probably not last half the time, and then will demand constant repair, while the trouble it will occasion by stock breaking through will be a constant source of annoyance and expense. I have found puriri the best fencing-timber, but, as this is now difficult to obtain, totara will be found the next most suitable material. This is not cheap at the present time, but it should be employed if possible. Another good timber, if available, is manawa—a swamp timber which is really equal to totara—and next to this comes hinau, prickly acacia, matai, and heart of rimu. Johnston's No. 8, either plain or barbed, will be found the most satisfactory wire.

Before attempting fence-erection it is imperative, if satisfactory work is to be done, to obtain a proper kit of tools. The more simple implements will no doubt be at hand. The kit should comprise a leather bag strapped around the waist to hang in front, spades (a short and a long handled one), a long-handled narrow shovel, a crowbar (for stony ground), a mall, a rammer, an adze, a light axe, a hammer, a wire-cutter, a 1½ in. chisel, a ⅝ in. auger or bit (but if the latter it should be of sufficient length to go through a post), an inch bit, a wire-strainer (if rollers are not employed), and a spindle for running out the wire. Though the ordinary spade can be dispensed with, it is always a handy tool. The long-handled spade is decidedly better for digging a post-hole, as it acts both as a spade and a shovel, but it must be properly made. Many I have tried have been very unsatisfactory, as the straps were too short, with the result that the handles soon broke just above the straps. The best long-handled spade I have used was made from a short-handled one, the handle of which broke and a long handle was afterwards fitted in. A shovel (which is more suitable than a spade for taking the loose material out of the strainer holes) should be narrow, as it is a disadvatage to make a hole wider than is absolutely necessary. The mall can well be home-made.

Order two 5 in. rings (1¼ in. thick and 1¼ in. wide) from a blacksmith, and shape the mall (which should be tapered a little to the ends) from a piece of titoki, prickly acacia, or other hard wood. It should be about 9 in. in length. The handle should be about 3 ft. in length. A piece of tea-tree will answer very well for this purpose. The rammer may also be home-made. If an old light axle-box is available, and a suitable stick be fitted into it for a handle, an admirable rammer is provided. If not, a piece of rough hard timber measuring about 4 in. by 3 in. at the bottom, tapering

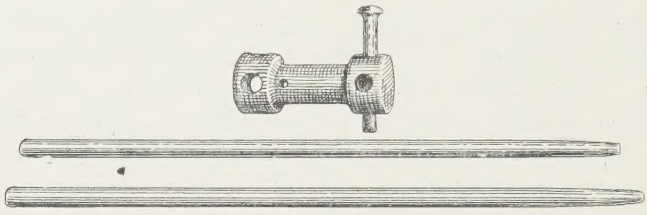


SOME NECESSARY TOOLS.

The leather bag (for staples), 1½ in. chisel, brace and bit, wire-cutter, and hammer.

to a convenient handle, and about 5 ft. in length, is all that is required. The axe should be light, as it is then suitable for pointing pegs and other light work. A 1½ in. chisel is advised, as this is the most useful size for making a mortise-hole for the stay end. Two bits are recommended—one for boring-holes in the strainer-posts, and the other for mortising the hole in the strainer-post to receive the stay—that is, where this neater and stronger method is adopted. The chain illustrated on the following page has a strong hook on one end and a ring on the other, to hook Page's strainer on to —a great improvement on the usual method of holding the strainer by means of a temporary wire around the post.

The best wire-strainer is Page's; and though this is in use at the Ruakura Farm of Instruction, the majority of the fences on

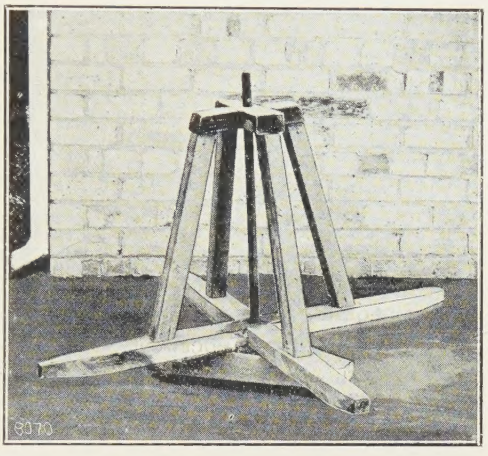


WALKER'S PATENT ROLLER AND STRAINING-IRONS.

the farm are strained by means of Walker's patent rollers, which do away with the necessity of a strainer, though this implies an expenditure of about 5d. for each wire at each straining-post. I strongly recommend the rollers for permanent fences, as when these are used it is much easier and quicker to tighten up loose wires. It simply means carrying two simple straining-irons (pieces of $\frac{5}{8}$ in. steel, 15 in. long, and slightly pointed at one end), and any slack wire noticed may be tightened up in a few seconds. The extra cost of the roller over the strainer method is more than justified. The spindle is simply constructed. The accompanying photograph illustrates the one I use in my work. The bottom piece, on which the spindle revolves, is made out of 6 in. by 4 in. timber, 2 ft. long, slightly tapered at either end. The bottom of the spindle is formed of three-by-twos checked in where they cross, slightly tapered at the ends, to lessen the risk of the spindle being caught by projections; a hole must be bored in the centre a little bigger than the bar around which the spindle revolves. The top of the spindle is formed of three-by-twos checked where they cross, and also having a centre hole for the bar. The bottom and top of the spindle are joined together by two-by-twos, which are placed in a slanting position in order to fit the varying centres of wire coils, these coming from the manufacturer fitted into one another and thus being all of a different circumference. The bar may be of inch iron, allowing for a foot to pierce the earth. The bottom end may be pointed. It will then serve as a crowbar, which will be found very useful in hard country.

SPECIAL CHAIN.

Before dealing with the actual work of fence-construction it may be well to refer again to the timber to be employed. If the fence is on a bush section it may pay to use a slightly inferior timber ready at hand, but a variety such as white-pine (except for battens) makes the fence a dear one in the end. The timber must be able to stand a fair time when buried in the soil. I would again urge the advisability of doing the work as well as possible, especially the securing of the strainer-posts in a substantial manner. The success of all fencing operations depends primarily on the stability of the strainer-post. Even with temporary fencing it pays to make the strainer-posts firm and substantial. As the strainer-post is such an all-important feature of fencing operations, I will try to describe the process of its erection as closely as possible when this phase of the question is reached.

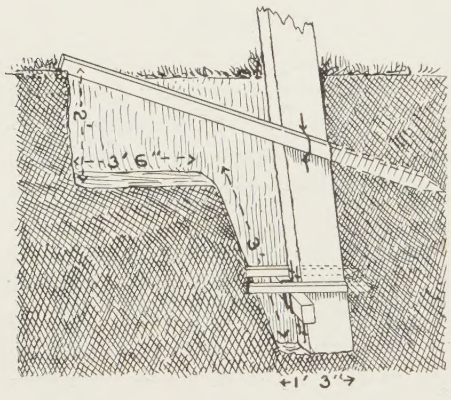


THE SPINDLE.

If the country is rough and wooded the first thing to do is to clear the line the fence is to take. If not on a surveyed boundary it will be necessary to sight the direction, which is easily enough done by employing a few flags and taking a sight from one to another of these. If the line has to be cleared of timber or scrub, room enough must be provided to work and cart or pack the necessary material. I always prefer to clear the way from point to point before touching the fence, as true direction can only thus be obtained. If the proposed fence is 20 chains or over in length it is necessary to flag the line—that is, place small flags about the height of a post (say, 4 ft.) or slightly higher at about every hundred yards. Everything is then ready to get down to actual work. As it is well to allow four posts to a chain I always go along the line and chip the earth at about the place where each post will come, and then cart the posts and wire, and drop these where they will be required. The distance from post to post is measured by a rod 16 ft. 6 in. in length, the distance between the posts. The fence should be 4 ft. high to the top of the posts, and the top wire should be 3 ft. 10 in. above the ground. The

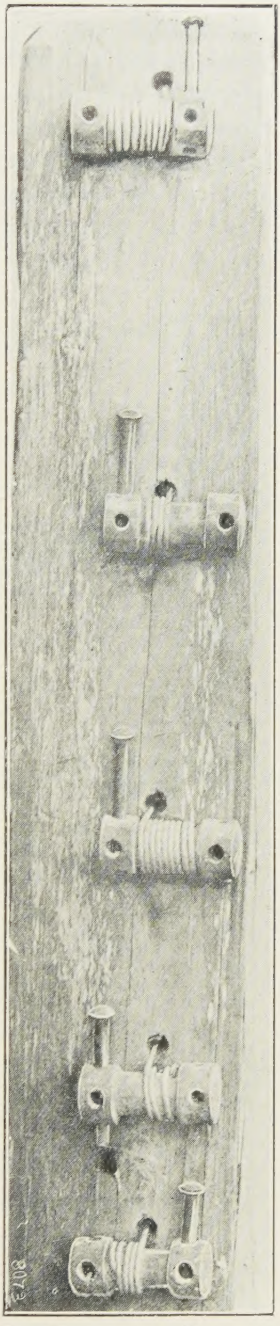
straining-post must be 4 ft. in the ground, so that it requires to be 8 ft. in length. It should not be made of smaller timber than 8 in. by 6 in., though 9 in. by 6 in. is better. The ordinary posts are supplied in lengths varying from 6 ft. 6 in. to 7 ft., and about 6 in. by 4 in. in thickness.

Before planting the straining-posts it is well to trim off with the adze that portion which will be above the ground, and to chamfer the top edges, as this little extra trouble gives a finished appearance to the work which will never be regretted, especially where the fence can be seen from the public highway. If the fence is to be substantial, and sheep and cattle proof, seven wires at least should be used. The two top ones, which should be 11 in. apart, should be barbed. The third wire should be 9 in. from the second, the distance between the third and fourth should be 6 in., and 5 in. should separate the remaining three from one another, the bottom one being 5 in. from the ground. It is therefore necessary to bore seven $\frac{5}{8}$ in. holes with the bit (or auger if a bit is not at hand) in the straining-post, commencing 2 in. from the top. The mortise (or hole) to receive the end of the stay must then be made. Make this between the second and third top wires, and a little to the side of the wire-holes, so that the stays will come in a line with, and on the same side of the wires as, the ordinary posts. This hole is easily made with an inch bit, making two holes at the top and at the bottom of the mortise, the holes being sufficiently apart to make the hole about 4 in. in length, the two auger-holes making the width 2 in. The mortise should be 1 in. deep. One of the posts, which should not be on the short side, will do very well for a stay. The end to enter the strainer-post must be trimmed down with the adze to fit the mortise. Having prepared the post, a "foot" made from one of the posts, and being about 4 in. by 2 in. in thickness and 2 ft. in length, is fixed about 4 in. above the bottom of the strainer and on the back of the post. It is fastened to the strainer with wire and staples. This must be well done. If the foot comes away, the post, with the great leverage of the stay and the heavy strain of the wires, will



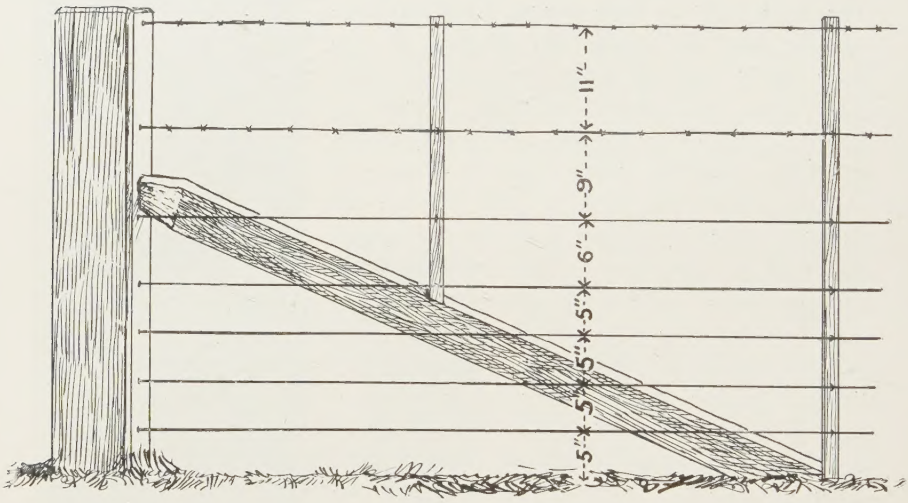
METHOD OF ANCHORING THE STRAINING-POST.

probably be lifted out of the ground. An alternative method is to pass a piece of the fencing-wire around the strainer, over the foot, and back again to the back of the strainer, stapling it well to both strainer and foot. In digging the hole to receive the post, excavate in a line with the fence; but make the filling come on the side of the post opposite to the stay. Thus having the post hard against the solid face, take out first of all the earth to a depth of 2 ft. for roughly about 4 ft. by 2 ft. (the width of the foot), and make the remainder of the hole only a little bigger than the size of the post and foot, the bottom of the hole being tapered with this end in view. The solid face should slightly incline inwards, to give the strainer a backward slope, so that when the great strain of the fence is put upon the post it will assume an upright position instead of inclining towards the pull of the wires. The ramming must be well done. The earth must be made as solid as possible underneath the foot and around the post. When the rammed soil is level with the top of the foot-plate place cross-pieces (measuring about 2 in. by 2 in.) —totara battens are excellent for the purpose—on the foot, one on either side of the post. These need not be fastened to either strainer or foot, but must be rammed as hard as possible, and should be rather longer than necessary to fit the hole. Point one end, so that when the wood is rammed to make it fit the pointed end will pierce the solid face. It is even advisable to make the pegs several inches longer than the length of the hole, and chip out a little earth on the front sides of the strainer-post (and level with the top of the foot-plate) so that they will be firmly embedded in position. When I have secured the bottom of a post in this manner I always feel safe in straining up a fence. If the ground is bad—that is, wet or of a very soft or



THE ROLLERS IN POSITION.

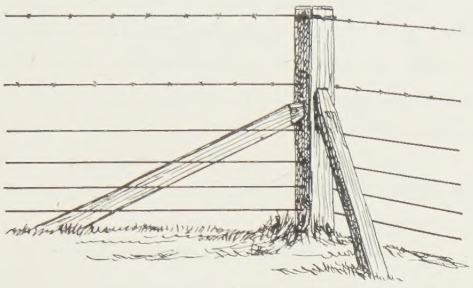
spongy nature—it is advisable practically to peg the post to the solid surface. This is done by driving, say, totara battens—about 4 ft. in length and pointed at one end—into the solid surface of the hole, and at either side of the post at an angle of about 25 degrees. These should be driven in as far as possible with the mall. They may be fastened to the post with wire, well stapled on. In swampy ground, where water would partly fill the post-holes in winter, I have securely anchored straining-posts by this method alone, but doubling the pegs by placing them on either side of the post. These pegs are advisable for securing an ordinary post where there is a dip in the ground and there is in consequence greater strain



END STRAINING-POST, SHOWING METHOD OF BRACING AND PLACING THE FIRST BATTENS.

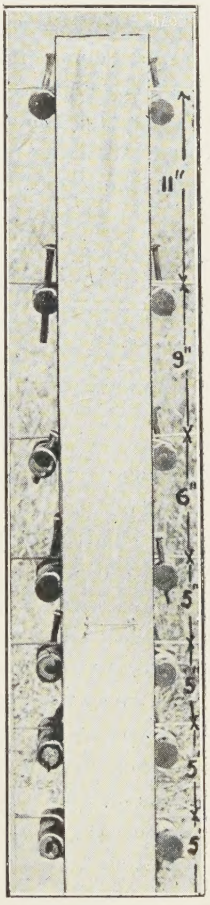
to be met. The hole for our original strainer-post may now be filled. It should be, of course, well rammed, and every care should be taken to keep the sides of the post plumb during the process. The stay must now be put temporarily in position. First of all, fit it in the mortise-hole. Then cut a post in half and sink it in the ground, with the back of it against the solid earth, making the hole 12 in. deep and just at the foot of the stay. Put the stay in its permanent position, and then drive into the earth, hard behind the horizontal piece of timber at the foot of it, three pointed pegs (2 in. battens or pieces split out of a post) to keep it in place. Fill up any loose earth about the post, and stay and ram it well down.

Having the line, another straining-post should be put in 16 chains away, with a double straining-post midway. Having these three posts erected, an ordinary wire should be run out from the centre post to either end and tightened up. This will be the second bottom wire in the fence. The wire can be given a straight direction by lifting it and allowing it to drop smartly on the ground. It is also advisable, before taking the wire as a guide to the position of intermediate posts, to go back to an end straining-post or to the centre double straining-post and cast the eye along it, when any false direction should be detected. The posts will be lying on the ground in about their desired position. Before placing a few of these in intermediate positions, in order to afford a guide in erecting the balance of the posts, the points on the posts where the wires will come when the posts are in position should be marked by means of a gauge-stick. Put these "guide" posts about 3 chains apart. They do not require any feet, except where there is a depression in the ground, but the soil should be well rammed home. Then run out another wire: the third top one I prefer instead of the top one, as it is a plain wire. However, it is better to place it temporarily in the position of the first wire, and take it down to its correct position when all the posts are erected.



METHOD OF STAYING CORNER-POST.

Now put in the balance of the posts, taking care to have these plumb and the tops uniform. A man with a good eye will need no assistance in plumbing his posts; but if he is not used to the work he can easily make sure of the post being plumb by sighting it with the rammer, holding this for the purpose (loosely between the thumb and the first finger) between the eye and the post. The eye will have to be depended upon to make sure the posts are at a uniform height. Do not be disheartened if your eye fails



CENTRE STRAINER.

you at first—it will surprise you how the eye may be educated with experience.

A gauge-stick is necessary. This may be made of any convenient piece of wood. It should be 4 ft. long and be marked plainly, preferably by notches made with a saw or pocket-knife, with the positions of the wires on the posts, so that by laying the stick on a post before this is erected the exact place where the wires should come may be plainly marked. These marks should also be made on the rammer, so that a further guide may be provided for accurately gauging the height of the post when sinking it in the ground.

The best place to run the wire from is the centre straining-post. The spindle should have been set up here in the first place, and the necessary stock of wire dropped at this point. Set the spindle up with the coil of wire on it alongside the post, and take the loose end of the wire over the shoulder and walk to one of the end straining-posts. When this is reached the wire is passed through the hole, carried around to one side, and made fast with two staples. Then come back to the centre strainer, and if the rollers are employed cut the wire off to the length required, and strain it up with the roller. The next wire to be strained should be run to the straining-post at the other end, and tightened up by a roller on the opposite side of the middle straining-post. It is necessary, as the wires are put on, to staple each of them on the line posts to keep them apart as they are being put up. Leave the barb wires to the last. It is necessary at the roller end to join 3 ft. or 4 ft. of plain wire to the barb, as the latter will not run well through the hole or around the roller. It would be found convenient and more satisfactory to do the same at the other end, but here only about 18 in. of the plain wire will be necessary. Having all the wires strained up, they should be stapled to the posts with $1\frac{1}{2}$ in. staples. The battens may then be put up. These should be 2 in. square, and, resting on the ground, should come level with the tops of the posts. Four to five should be allowed between the posts. The wire should be stapled to these with 1 in. staples. Make sure that the top and bottom staples are well driven home, so that the battens may be kept firmly in position. The staples on the other wires should be fairly loose, so that the wires may run. It is well to have an assistant in putting on the battens, so that a weight may be held behind the batten when the staples are being put in.

MANNER OF KNOTTING WIRE ENDS TOGETHER.

At a corner where the fence comes at a right angle two stays to the straining-post are required. The second stay should incline a little inwards—say, a couple of feet off the line of the fence. Where the angle is not acute one stay will do, but it must then come midway between the two lines of fencing.

A POTATO EXPERIMENT.

James Drysdale.

At the Weraroa Experimental Farm an experiment was recently conducted to determine the best type of potato to select for seed purposes. The experimental area was ploughed from lea in July, 1913, and was planted on the 30th September of the same year. The variety selected was Up-to-date, and was grown alongside the main crop of that variety. Three rows were laid out. In No. 1 small whole potatoes were planted; in No. 2 selected uncut medium-sized tubers, about the size usually described as "suitable for the table"; and in No. 3 row cut seed from unselected rough large potatoes. Following was the result:—

No. 1 row: Commercial size, 92 lb.; small, 60 lb.: total, 152 lb.

No. 2 row: Commercial size, 313 lb.; small, 125 lb.: total, 438 lb.

No. 3 row: Commercial size, 131 lb.; small, 43 lb.: total, 174 lb.

No. 2 row not only gave a larger increase in weight over the other rows, but the potatoes were more satisfactory. The growth from the beginning was strong and vigorous, there not being a blank in the row, while in every row in the main crop of the same variety there were blanks to be found. Nos. 1 and 3 were a fair average of the half-acre.

Agriculture is the mother of a nation's strength, which industry employs; agriculture represents the broad acres in which the trees of industry and commerce are planted, and from which they derive their nourishment.—*Prince Buelow, Germany.*

On a field of the Ruakura Farm of Instruction, of very even character and position, which has been uniformly treated with artificials, and the one class of crop produced in the season, an experiment is to be laid out to determine the most economical system of manuring—that is, the mixture which will secure the most profitable returns. One plot will be left unmanured, and the contiguous plots will be manured with varying dressings, ranging from very light to heavy applications.

THE WORLD'S MEAT-SUPPLY:

THE POSITION IN AMERICA.

E. Clifton.

The meat-supply is a problem that is of supreme importance to the world. Especially does this apply to the older and more developed countries of Europe. It is also of first importance to newer lands, such as the United States of America.

It is but a few years ago that the volume of the increase of the meats for exportation was the theme of the great American packing companies; the number of live-stock exported and the voyages of the cattle-ships to Great Britain were chronicled with regularity. To-day it is no longer the exportation of live-stock, or the millions of pounds of canned meats, that provides quotations for the commercial world, or creates rivalry for the privilege of the cheapest transportation among the magnates of the railways. It is accepted that America, as with other countries, seeks new fields from whence to import the animal food to supplement the proportion that is raised by her farmers.

It is possibly not recognized how immense is the grazing industry of America. I may be permitted to quote some figures. The number of animals slaughtered annually is 88,358,815. Of this number, hogs represent more than 50 per cent. The proportion set out is: Hogs, 60·2; sheep and lambs, 16·7; grown cattle, 15·4; calves, 7·4; other stock, as goats, less than 1 per cent. It is also accepted that the ratio of consumers to producers is also increasing—that is, the population of the town is becoming further and further out of proportion to the community on the land. There is again the fact that individually there is a greater demand for animal foods. Those who were content with meat as supplementary to their general dietary now consider animal foods as the chief sustenance. These factors form a serious consideration in modern life. It must not be supposed that in this meat problem America is differently situated from other countries; it is probably more in evidence there, and greater popular attention is directed to this food-supply, because America has so rapidly changed from being an exporting country to an importing country of animal foods. This is shown in the fact that the exportation of meat

from America to Great Britain fell from 162,000,000 lb. in 1908 to 680,000 lb. in 1913, a perfectly insignificant quantity, so much so that it is probably not a true export, but represents mere shipping requirements.

It would appear that the immediate result of this shortage of meat will create a competition between those countries, such as Great Britain, that are accustomed to look for their meat-supply from outside countries, and those, such as America, that are only now requiring supplementation by importation. The established sources have been Australia and New Zealand, Canada and Argentina. The nations now add to these exporting countries other lands—as, for instance, the comparatively undeveloped parts of South America, including the central regions of that Continent. Already cattle-raising is being exploited in Brazil. The other sources that may participate are South and Central Africa.

It cannot be excluded from calculation that there is an enormous latent power of meat-production in all countries, and particularly in America. The farmer can astonish the world if he but devotes himself to stock-raising; this is well within his power. The price of fattened animals offers every inducement to the farmer to enter into this line of business. There is no undertaking on the land that has a greater security of profit than grazing and fattening; further, there are no means more sure for improving the farm than this. The fattening of animals assures the conservation of the fertility of the soil. This is mentioned, as it applies to the farmer of all lands; in one it may be the stall that the animal is fattened in, in the other it is the carefully managed pastures or on the sedulously cultivated fields of roots that the fattening is effected. It is neither the wide pasture nor the production of crops, but the co-ordination on the farm of plant and animal production that will provide the most useful occupation of the land.

There will be here the field of action for the modern farmer. He will apply the effective cultivation of the soil, selection of the most productive seeds, the acceptance of definite rotations of crops, and the careful skilful breeding of live-stock. It is under these conditions that science, with practice, will lead the most intelligent of our people back to the land. It may be that from this very problem of the supply of meat for food that the return to the land is to be realized.

Readers can best show their appreciation of the *Journal* by bringing it under the notice of their neighbours. Many have already done this. Their co-operation is greatly appreciated.

DAIRYING ABROAD.

Walter Wright.*

My visit to Holland was unfortunately curtailed owing to want of time, but I was able to make a brief investigation in the famous Edam cheese district of that country.

An interesting farm is that of Simon Pronk, at Broek, in Waterland. The farm is about 50 acres in extent, on which forty head of cattle are kept, of which thirty are milch cows. Two-thirds of the total pasture-grounds are used for haymaking. The soil is very fertile for grazing-land, consisting of a thick layer of black earth under which there is a hard layer of clay and a peat subsoil. No cheese is made on this farm, as all the milk is sold for consumption in the Town of Amsterdam, for which about 6½d. per gallon is received in the months of November, December, January, and February, and about 5½d. per gallon in the remaining months. Milk with less than 2·85 per cent. of butter-fat is refused. During half the year the cattle are fed in the stable with hay, and with pulp which is obtained from the beet-sugar factory at Halfweg. This pulp is mixed with linseed-meal, linseed-cake, maize, and a little molasses. The principle of heavy feeding is adopted here, as the cows which are milked are at the same time fattened.

A visit was also paid to the cheese-farm of I. Bruyn, and is said to be a typical farm for the making of Edam cheese. Formerly, Edam cheese was exclusively made at the farms twice a day, immediately after the cows were milked. This has been changed. As a rule, cheese is at present being made at the farm only in the morning; the milk of the evening before is left untouched during the night, and, after the small layer of cream that has formed is taken off, is mixed with the full morning milk and then worked into Edam cheese. In the different places where this class of cheese is made there are various methods adopted. As a rule, the process of making Edam cheese is as follows: The milk is brought to the proper curdling temperature, 80° to 84° F., thereupon colour and rennet are added, and frequently a starter, such as sour whey, is used. The milk is coagulated, and in about half an hour is ready

* Inspector of New Zealand Dairy-produce in Great Britain.

FARMSTEADING, MODEL FARM, BROEK, IN WATERLAND. I. BRUIJN, PROPRIETOR.

The building comprises dwellinghouse, cow-byre, cart-shed, accommodation for young stock, &c., and hay-loft.

to be worked with a curd-stirrer or knife till it has become sufficiently dry and solid. The curd is heated up 100° F. in the whey, and then put into the cheese-press, sometimes in large lumps and sometimes broken up before going to the press. In the latter case it is well kneaded. A milky liquid then appears, which is called "frosted" (white whey). The cheeses are wrapped in a small cloth and pressed during four or six hours, and then salted. After that they are put into cheese-presses in order to preserve the shape. Salting lasts three to seven days, according to the size of the cheeses. The cheeses remain on the shelves maturing for about two or three weeks, when they are taken to market and are transferred to the cheese-merchants, who either immediately sell them again or store them for a longer or shorter period in their warehouses. Previously to taking the cheese to market the crust is oiled. The Edam cheeses are made in three sizes—the ordinary small ones, weight about 2½ lb.; the second size, about 9 lb.; the large sized, about 13 lb. The main cheese-market is held on Fridays at Alkmaar. Purmerend and Hoorn are also important markets. The majority of the Edam type of cheese are not full cream.

On this farm, which consists of about 50 acres, about thirty-six head of cattle are carried all the year round, ten of which are young stock. The building, or farmhouse, which is held to be of a model suitable to this country, is very interesting in its construction. Under the one roof the farmer lives, with his cattle, farm implements, and cheese-making plant. Overhead is the loft where the season's supply of hay is stored, the whole of the building being kept scrupulously clean. During the summer months the cows are milked out in the open; the milking-shed or cow-byre for that period then becomes really a part of the dwellinghouse. The cow-stall is given a nice appearance by the use of shells, curtains, and carpets. A portion of this part is sometimes used for cheese-press, &c. As will be seen from the accompanying photograph, the dairy herd on this farm are of the true Holland type.

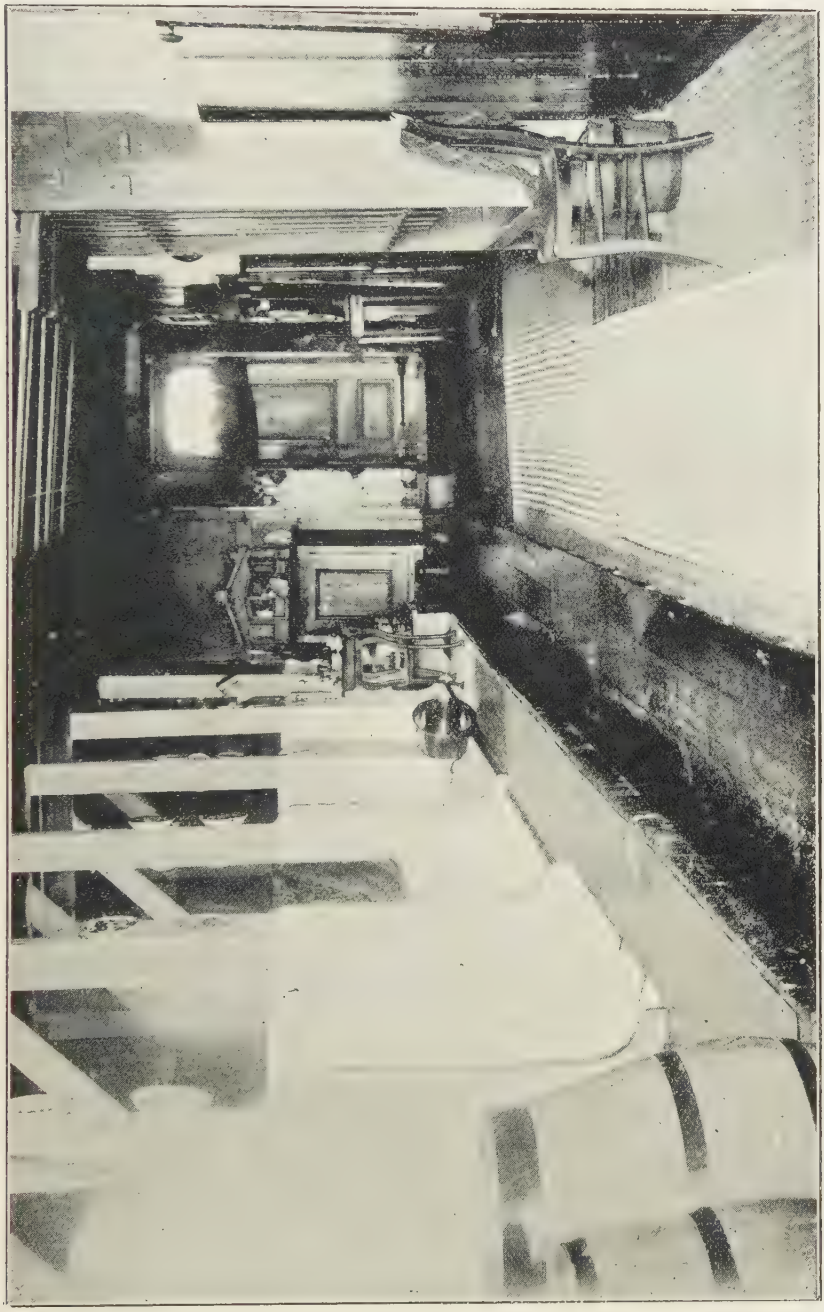
A visit was made to the cheese-factory, *Hoop doet leven*, at Monnikendam. The building is of brick, and is well appointed. Abour 800 gallons of milk per day is received at the height of the season, from which about 200 cheeses (Edams) are made. This is a co-operative factory with thirteen shareholders, and milk is also bought from six farmers who are not shareholders. The milk is bought irrespective of its butter-fat content. Abour 4½d. per gallon is received by the suppliers for their milk, and about ½d. per gallon is calculated to be made from the whey. As a rule, in the Netherlands, milk for the manufacture of dairy-produce is bought and paid

for according to the percentage of butter-fat contained therein. I noticed that the whey-tank in this factory was lined with porcelain tiles, cemented in with pure cement. In discussing this with the manager he advised me that the acid in the whey did not affect the tiles, but eats into the cement that holds the tiles in position. Judging by the information I received, the use of the porcelain tiles is an improvement upon the ordinary concrete whey-tank, being much more easily kept clean, and lasting longer without having to be repaired.

Our journey was continued to Volendam, from whence the De Beemster district was inspected. This block of country is very fertile, having at one time been under water. The Beemster has a surface of 18,125 acres, which was formerly a lake, but in 1613 was pumped dry and surrounded by a dyke. This is named in Dutch a *droogmakerij* (land which is made dry). The Beemster lies 13 ft. below sea-level. The water is kept at a fixed level in the ditches by three pumping plants *(stoomgemaal)*. The soil, which overlies a thick layer of heavy clay with peat underneath, is remarkably good grazing-ground. An interesting feature is the division in square blocks of 850 acres, which are split up into twenty farms. These are situated quite regularly along beautifully paved roads which cross each other at right angles. The farmhouses have all the same shape—a square building, of which the roof ends in a point. The idea has been a square hay-stack, in the middle of which the roof is lengthened to four sides, so that room is made—(1) for the cow-stable, (2) for the stable for the young cattle, (3) for an open space (for carts and implements), and (4) for a place where the farmer lives.

As the peat layer develops considerable gas, this is gathered in a gas-holder and conveyed to the house for lighting and cooking, the cost of the holder being about £50. Each farm has a small orchard in front of the house. The pasture stretches out behind the house in a long strip of land, which is again divided lengthways into two pieces. Alternately one piece is for hay, and is manured every year (manure with a very little straw); the other piece is used as pasture-ground. The farm is generally 46¼ acres, on which is usually kept sixteen to seventeen milking-cows, four yearlings, four calves, eight breeding-ewes, twenty-five lambs, and one horse, and also pigs and a number of chickens and geese. Most of the farms are rented for 100 guelders per hectare, or £3 6s. 8d. per acre, and sometimes as high as 130 guelders, or £4 3s. 4d. per acre. The price of the land is about 3,000 guelders per hectare (£250 per 2½ acres), or £100 per acre.

Cow-byre (Winter) at the Model Farm, Broek, in Waterland.



The Same Cow-byre (Summer).

Large numbers of cattle are fattened on the pasture, and the Beemster is a well-known district for its favourable results. During the last few years the farming operations in this block has almost entirely been confined to dairying. As the grass and hay is very nutritious, it is possible to breed in the Beemster a big heavy cow (750 kilogrammes, or 1,650 lb., life weight), with a milk-yield of 900 gallons, and more during a lactation period, and is at the same time a very good beef-producer. Therefore the Beemster dairy-farmer requires a large frame, well ribbed, and short loins, and does not like a narrow breast in his dairy stock. The cattle in the Beemster belong to the black-and-white Holland breed (Friesian), which is in foreign countries often wrongly called "Holstein" or "Holstein-Friesian," a name which is quite misleading, and originates from the North American trade, to which country De Beemster has exported a considerable number of excellent specimens. Formerly the cattle were more white than black, but now the contrary begins to appear, due to the requirements of the trade that has developed with foreign countries. A good many farmers are rather cow-keepers than genuine breeders, and therefore many herds are not uniform, and have not the quality one might expect under such very favourable natural conditions.

Some very fine cows were seen on the farm of P. Leeman, one of the cows being credited with a milk-yield of 1,000 gallons as a two-year-old; the mother of this cow at six years gave a milk-yield of 1,600 gallons. This farmer also secured first honours for one of his cows at the show that has just been held, and I think it is admitted that his herd of dairy cows is the best in this district. There is a bull association in the district; and a word might here be said about the co-operative bull associations of Holland. Owing to the dairy herds not being very large, due to the small holdings, the individual dairy-farmer is not able to find sufficient work for a bull to do, and at the same time he would probably not have the necessary capital to purchase a good animal. The very profitable solution of the difficulty is arrived at by the farmers in different districts combining and forming local bull associations. By this means they have been enabled to obtain the very best animals for their purpose, and at no great expense to themselves individually. The estimated cost for feed, &c., for a bull in this country is about £16 to £17 per annum. I am of the opinion that this method of breeding stock has been an important factor in developing the character and fixing the type of the Dutch cattle, and could be applied with profit to certain dairying sections of the Dominion, particularly those districts where small dairy herds are kept. Bulls are put to service in Holland when they have reached the age of

two years, and cows are served during the months of May, June, and July. The bulls of the Holland breed are not generally so docile as those of the shorthorn breed. In some districts the bull's attendants are peasant women, and the animals are said to be more docile in their hands than in the hands of men. There was a striking illustration of this fact witnessed at the agricultural show, where one of the bulls in the show-ring was led by a peasant woman from the Limburger district, the animal being exceedingly docile, giving no trouble, whereas some of the other bulls required two male attendants to handle them in the show-ring. In cases where there was only one male attendant the bulls gave a good deal of trouble at times.

The price of cows in the Beemster district runs about £30 to £45 per head; poorer grades, about £22. The land in this district carries about one cow to 2½ acres, as well as supplying the necessary hay-crop for feeding the cattle during the winter months. Here in the north the stock, young and old, are stabled for about six months of the year.

Returning from the Beemster to Pumerend, a call was made at the Middle Beemster Co-operative Cheese-factory. About 1,500 gallons of milk were being received daily at the time of our visit, the whole of which is used in the manufacture of Edam cheese. Milk is received from sixteen shareholders, and also from eleven suppliers who are not shareholders. The company charge the non-shareholders 1½d. per hundredweight for the cheese made from the milk supplied by them.

Market gardening is on the increase in Holland, and in some districts is displacing dairying. Particular attention is being paid to the bulb-growing industry. Land in the vicinity of Den Haag that was worth £40 to £50 per acre for dairying is now valued at about four times that amount for gardening purposes.

Of late years the export of Dutch Cheddars to the United Kingdom appears to have been on the increase. From the figures supplied by Mr. Eriks, of the Friesland Co-operative Exporting Society, it will be seen that the quantities are somewhat erratic. They are as follows: 1908, 11,773 cwt.; 1909, 18,536 cwt.; 1910, 11,377 cwt.; 1911, 19,436 cwt.; 1912, 33,859 cwt.

The foregoing figures refer only to the business of the aforementioned society. This is a co-operative association composed of the dairy companies of Friesland, and is formed for the purpose of exporting and selling the produce of the members of the association. It has also a staff of dairy instructors, whose services are available to members of the association. There is an association of co-operative dairy companies in the Netherlands working on some-

what the same lines as our North and South Island associations. The membership is eighty-two companies; only thirty-two of these, however, are members of the Co-operative Export Association, of which Mr. Eriks is the manager. There are 850 creameries and cheese-factories in the Netherlands, 132 being situated in Friesland, where the milk is generally dealt with in larger quantities than in the other States of the Netherlands. All Cheshire and Cheddar cheese made in Holland under control must be branded "full cream" or "half-meat," as the case may be, also with the registered number of the factory and the words "Dutch produce."

There are at present in Sweden some twelve hundred co-operative bull-keeping societies, which are encouraged by the provincial agricultural societies by loans without interest for the purchase of bulls and by special prizes at shows.—*Journal of the British Board of Agriculture.*

Experiments at the Ruakura Farm of Instruction emphasize my previous experience that the dairy cow will milk better on good luxuriant pastures, alternately used and rested, than on the best of hand-feeding of concentrates, though individual cows do much better under hand-feeding than do others.—*Primrose McConnell.*

The expansion of the Danish export trade in butter may be gauged from the following figures, in each case representing millions of pounds: 1865, 10; 1885, 55; 1895, 145; 1905, 208·10; 1906, 208·89; 1907, 226·86; 1908, 230·16; 1909, 233·79; 1910, 231·40; 1911, 243·91; 1912, 234·54. Since 1904 several dairies have begun to export cream to Germany, due to the fact that Germany imports ever-increasing quantities of dairy-produce; but as butter pays a duty while cream is free the importation of cream affords a greater margin of profit. The export of cream from Denmark has steadily grown.—*Bulletin of the International Institute of Agriculture.*

A Portion of the Dairy Herd, Model Farm, Broek, in Waterland.

GREEN-MANURING.

T. W. Lonsdale.

Although the ploughing-under of green crops for the purpose of ameliorating soil conditions and supplying plant-food has been practised from time immemorial, but few farmers of to-day have the courage to plough-under a green succulent crop when this could be utilized very profitably for feeding to stock. Those who have adopted green-manuring as part of their regular rotation course have good cause to continue the practice.

The fertility of a soil depends to a large extent upon the supply of humus, or decaying organic matter, and therefore the benefits accruing from green-manuring are not to be placed in the same category as those so apparent from the application of artificial fertilizers. The latter practice is based on supplying either directly or indirectly those plant-foods, necessary to optimum growth, which are not available in the soil in sufficient proportion. The presence of a supply of humus or decaying organic matter alters considerably the mechanical condition of the soil. The principal result is that the soil exhibits an improvement in texture, and acquires greater power of absorbing and retaining moisture. By opening up stiff soils more space for soil-atmosphere, so important from biological and chemical standpoints, and more space for drainage is gained. The effect of green-manuring a sandy soil, such as that which characterizes the tableland at Moumahaki Experimental Farm, or on a pure sand, is to form an improved medium for plant-food and to increase the cohesive power of these soils. This is most apparent in the orchard and garden where green crops have been dug in at every opportunity. This soil is distinctly more fertile, is exhibiting far better texture, and does not so easily run to dust.

While the principal effect of green-manuring is on the mechanical condition of the soil, another most important result is an accumulation in the soil of nitrogenous organic matter. Catch crops growing on stubbles after harvesting cereals and all leguminous crops collect and store large quantities of nitrogenous compounds. These crops when ploughed under eventually increase the supply of nitrates for subsequent crops. The nitrogenous compounds con-

tained in the green manure are unavailable for utilization as plant-food until sufficient decay has taken place, or, in other words, until bacterial action has converted the organic nitrogenous compounds into inorganic nitrates or other assimilable compounds. For the rapid and effectual carrying-on of this process of nitrification, a supply of lime in some form is a necessary aid. Green-manuring and liming should go hand-in-hand, as the lime not only rapidly renders available the nitrates, but in so doing corrects any acidity that may arise during decomposition of the vegetable matter. The old adage—

Lime and lime without manure
Makes both farm and farmer poor—

can be applied; but in this saying, it must be remembered that the word "manure" does not refer to the present-day artificial fertilizer so frequently termed "manure." Where farmyard manure is not available, green-manuring must take its place in any intensive system of agriculture. The present high state of fertility of the tableland at Moumahaki is attributed largely to the systematic ploughing-under of green crops. The modified four-course system under which these fields are cultivated is as under:—

Grass land — Skim-ploughed and cross-ploughed: First year—Root and forage crops, and potatoes; usually sown in ridges, and intercultivated. Second year—Cereals; red clover sown in spring in young crop, or white mustard sown on stubble; this catch crop used for green-manuring; dressing of ground limestone, 1 to 2 tons. Third year—Leguminous crop; vetches, peas, or beans. Fourth year—Either (*a*) catch crop ploughed under in spring; ground limestone, 1 to 2 tons per acre; lucerne: or (*b*) temporary pasture; prairie grass or Italian rye-grass; red, white, and alsike clover.

During the spring of 1913 three cereal fields were seeded with red clover at the rate of 12 lb. per acre. After the cereal crops were cut the red clover made rapid growth, and had been lightly grazed by calves, pigs, and other young stock previous to being ploughed in. Another stubble was discked and seeded with white mustard at the rate of 10 lb. per acre. This has made good growth, and will be ploughed under when several feet high.

The area under lucerne at Moumahaki is now over 40 acres. The successful establishment of lucerne and the excellent results obtained are attributed largely to the beneficial action of green-manuring and the subsequent good dressing of ground limestone. One needs only to excavate some lucerne-roots and observe the great development of rootlets and nodules where these have access to decaying organic material to appreciate the good results achieved.

With a view to ascertaining the relative values of several crops for the purpose of green-manuring on the sandy loam of Moumahaki, plots were seeded on the 23rd December, 1912, with the results shown in Table I.

Table I.—Comparative Value of Crops used for Green-manuring, Season 1913.

(Soil, sandy loam; sown, 23rd December, 1912.)

Green-manure Crop.	Seeding per Acre.	Cost per Pound or Bushel.	Cost per Acre.	Approximate Weight, ploughed under on 2nd April.	Yield of Green Rye-grass and Red Clover, in Tons per Acre.
			£ s. d.	Tons.	Tons.
White mustard ..	20 lb.	4½d. per pound	0 7 6	12	10·38
Scotch vetches ..	2 bushels	10s. per bushel	1 0 0	6	9·33
Rye-corn ..	2 ,,	5s. ,,	0 10 0	10	8·62
Bare fallow ..	..	..	..	..	7·66

All plots received a dressing of 2 cwt. basic slag and 28 lb. sulphate of potash.

I wish to emphasize that these are the results of only one year's experiments, and as such are by no means to be taken as conclusive, but they serve as an indication as to the most profitable methods to follow until further experiments substantiate those of 1912. Another point to be investigated is the lasting effect of the various green manures. The beneficial effect of green-manuring on the first succeeding crop is shown to be great, but this beneficial effect must be apparent for many succeeding crops.

The advantages of using white mustard are: (1.) Rapidity of growth—can be ploughed under from six to eight weeks from seeding. (2.) Rapidity of decomposition in a light soil; a crop to be used for green-manuring should be ploughed under in ample time to allow of sufficient decay before the next crop is sown, and therefore rapidity of decomposition is frequently a decided advantage. (3.) Cost; the seed is cheap, 10 lb. per acre being sufficient.

It would be expected that a nitrogen-collecting crop such as Scotch vetches would prove more beneficial than was the case in this experiment. The Scotch vetch thrives extremely well on these soils, and its roots are abundantly supplied with nodules. It will be seen, though, that the approximate weight of the vetch crop ploughed under was only one-half that of the white mustard.

It is apparent that different soils require different crops for green-manuring. At present the following are more generally

utilized: On sand, blue and white lupins; on sandy loams, white mustard, red and crimson clover, and Scotch vetches; on heavy clays, Scotch vetches, red and crimson clovers, trefoils, varieties of lotus, rape.

There is one recently introduced plant—namely, elephant-ear mustard—which promises to be of value for green-manuring. Experiments are about to be initiated to test the value of this and of other crops for green-manuring purposes on the clay lands so prevalent in the districts north of Auckland. It is certain that successful utilization of these lands will depend largely upon green-manuring, and the first step towards this end is to ascertain which crops are suitable for the purpose.

The comparative value for soil-amelioration of leguminous crops which have been removed from the field is a subject closely akin to green-manuring. During the season 1913 several leguminous crops were sown in Field No. 1 previous to grassing. This also is the result of one season's trial, and is not to be taken as conclusive. The yields of green grass and clover are set out in Table II.

Table II.—Comparative Value of Leguminous Crops for Soil-improvement previous to Laying down Pasture, Season 1913.

Leguminous Crop.	Seeding.	Resultant Crop.	Yeild of Green Rye-grass and Red Clover, in Tons per Acre.	Remarks.
			Tons.	
Scotch vetch ..	2 bushels	Threshed for seed	11·44	Good sward.
Crimson clover..	20 lb.	Cut for ensilage	9·50	Darkest green; very clean; more clover.
Partridge peas..	2 bushels	Threshed for seed	6·16	Lightest green; many self-sown peas came up with grass, but were not relished by stock.

The importance of green-manuring for the poorer and more stubborn soils of the Dominion cannot be overestimated, and points to be considered in this connection are,—

(1.) Utilization of those crops for green-manuring which are suited to the particular class of soil.

(2.) Application of ground limestone or lime in conjunction with green-manuring.

(3.) Crop should be ploughed under in ample time to allow of sufficient decay before the next crop is sown.

The benefits derived by the soil are—(1) Improvement in texture; (2) increase in nitrogen-content; (3) greater power of absorbing and retaining moisture; (4) freer surface-drainage; (5) gradual darkening in colour, and consequent improvement in absorbing heat; (6) increased freedom from weeds.

The more general application of the practice of green-manuring will go a long way to making productive vast areas which are at present blessed with ample sunshine and rain from above and great stores of plant-food from below, but require that man shall by his skill make a medium for plant-growth—namely, a fertile soil.

The manuring of the "catch crop" intended for green-manuring should not be lost sight of. The fertilizing-constituents therein contained are taken up by the plant, and only with rapid decomposition of the green crop are these elements made readily available for nourishing the crop intended to be subsequently grown.

In a dry season or during a dry period the practice of green-manuring has to be carefully controlled, for the reason that if ploughed in during such a period the crop has the tendency of rendering the soil drier than it was before, this having a detrimental effect upon the growth of the following crop. Thus it is important to plough in green crops when the moisture is fairly plentiful. Too heavy a growth should also not be turned under, and the crop should be ploughed in diagonally by means of a fairly upright furrow, otherwise there will be a tendency for the accumulated green material to check the natural flow of capillary water from below. For the turning-under of green crops, especially if fairly long, the use of a chain attached to the coulter will be found of service to ensure the burying of all green material.

On the 8th January, 1912, a field of 15 acres was sown with swedes. A portion of the field had previously grown vetches and oats, a good portion of which was ploughed under. In May, 1912, the yield of roots on the land previously in vetches was 39 tons per acre, and the yield from the portion which had not received green-manuring was only 29 tons per acre. With the exception of the green-manuring of a portion of it, the field was treated similarly throughout.

No food is so cheap or is so effective in the feeding of deep-milking cattle as good pasture. It is only when the pasture is of poor feeding quality, is dried up, or is of too rank a growth, that supplementary fodder is required.

CHERRY-CULTURE.

G. Stratford.

Many inquiries have been received with regard to the growing of cherries, and the following short article has been written with the idea of helping those who intend planting one of our most delicious fruits. The article is not intended to be exhaustive by any means, but a few hints may be given which may serve as a guide to the inexperienced grower. The cherry can be grown to perfection in New Zealand, although I think there is no other fruit-tree so troublesome to the amateur grower. At the outset it will be just as well to state that unless it is intended to plant cherries on a large scale—say from 2 to 4 acres—the grower will have to seriously consider the problem of wire netting, for small birds have such a liking for cherries that the grower with very few trees is usually saved the labour of picking. A grower with a large area does not miss a few cherries so much, and can often supply some means of destroying the birds. If wire netting has to be used, then I would advise nothing larger than the ½ in. mesh, this being the only size to stop the "silver-eyes," which do so much damage in some districts. There is no doubt that the growing of cherries on right lines pays handsomely, the price very rarely being less than 8d. per pound, making them too much of a luxury for the average householder to indulge in. Probably the first consideration in planting out a cherry orchard is the selection of site and soil.

Site and Soil.

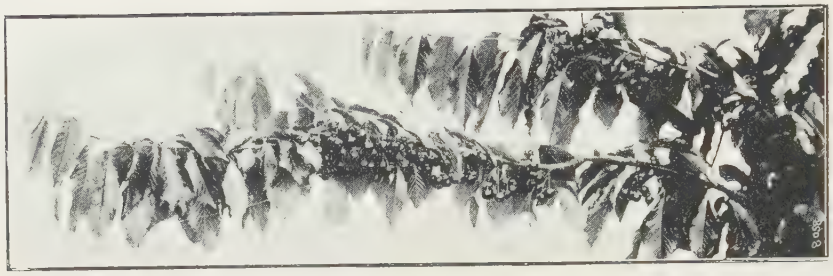
Opinions differ greatly as to the site of a cherry orchard, some growers saying a certain slope is best, while others maintain that level country produces the finest results. One of the most important factors to be considered is drainage; and if there be any possibility of choice in the selection of the site, the orchard should be planted on land somewhat higher than the country around about. This will ensure good drainage, while late spring frosts, which are often fatal to the cherry crop, may thus be avoided. Cold air, being heavier than warm air, always seeks the lower parts, therefore while trees placed in a hollow may be ruined by late frosts, those planted in higher land may escape altogether. This is a factor of great importance to the cherry-grower. Not that it is advisable to

plant cherry-trees in such high land that they would be fully exposed to the winds, for that would probably be more disastrous than the chances of loss by frost. Sloping land tends to provide good natural drainage, another most important factor in the growing of cherries. Where natural drainage does not exist other methods of drainage must be resorted to, it being a well-known fact that cherries will not endure "wet feet." The best way to drain a cherry orchard, the land of which is inclined to be wet or puggy, is by means of tile pipes placed between the rows of trees. In soils that are fairly loose, pipes laid from 30 ft. to 50 ft. apart will be found sufficient, while in very heavy land having a stiff subsoil it would be advisable to lessen the distance between the piping to 20 ft. Great improvements can be made in the drainage of a cherry orchard by means of subsoiling. If growers would only realize the great amount of good done by subsoiling I am quite sure this operation would not be so neglected. It is specially beneficial on soils that are underlaid by a stiff clay. Subsoiling is accomplished by running a subsoil plough in the furrow left by the ordinary plough, loosening the soil to an additional depth of from 14 in. to 15 in. Treating soils in this way not only deepens them, but promotes good drainage, aerates the soil, increases the water-holding capacity, and enables the roots of the trees to penetrate farther into the soil in search of food and moisture, a condition which will be appreciated in a dry season.

Sites having a northern or eastern slope are most suitable for a cherry orchard, owing to the fact that they are usually more protected from the prevailing winds, and also obtain the maximum amount of sunlight, so beneficial to the ripening of the crop. As to the soils most suitable for the growing of cherries, I have seen heavy crops of well-matured fruit grown on land with a good clay subsoil, whilst equally good results have been obtained in the case of cherries grown on rich loamy soil having a sandy or shingly subsoil. Needless to say, the land having a clay subsoil had been thoroughly well drained. No doubt much depends upon the physical condition of the soil, and it might be said that cherries will do well on any fairly good land that has been carefully prepared. Speaking broadly, cherries will be found to do well in almost any soil that allows of ample surface drainage and subdrainage, and that has a fair supply of plant-food for the development of healthy wood and fine fruit.

Preparing the Land.

It is most desirable that a cover crop should be ploughed in before planting the trees. Too much stress cannot be laid on the value of humus for the cherry orchard, for not only does it



Werder's Early Black.

Claremont.

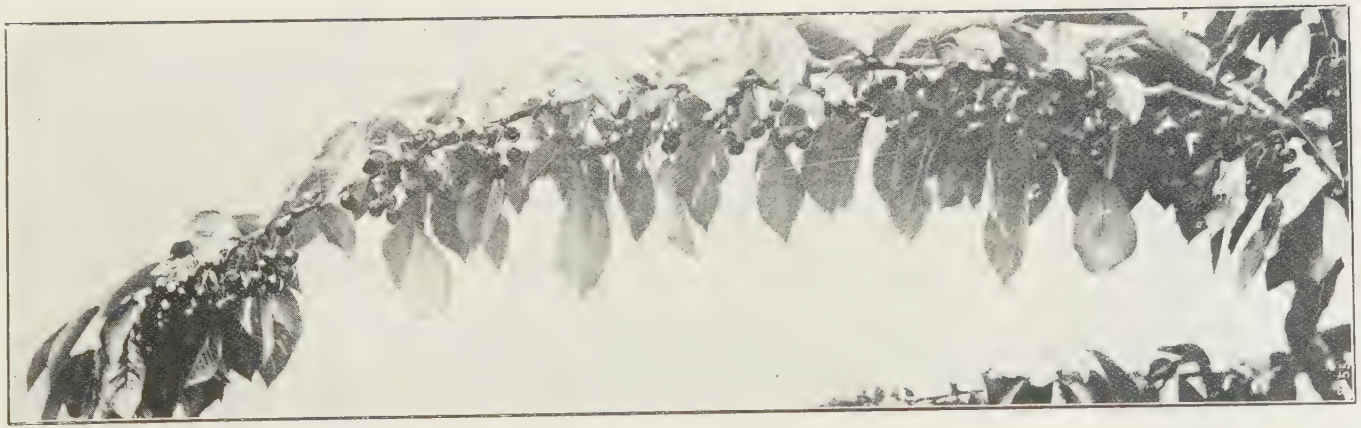
Bigarreau Napoleon.

G. E. Shailer, photos.]

reduce the cost of fertilizing to a great extent, but it keeps the soil in a condition necessary for the successful growing of the cherry. Should the soil become deficient in humus at any time during the lifetime of the tree, green crops may be sown and ploughed in. This means improving the water-holding capacity of the soil, and the cherry requires plenty of moisture to maintain a heavy crop. The best time to prepare the land for planting is, undoubtedly, during the autumn, allowing it to remain fallow during the winter. This allows the soil to catch and hold the rains during the winter months.

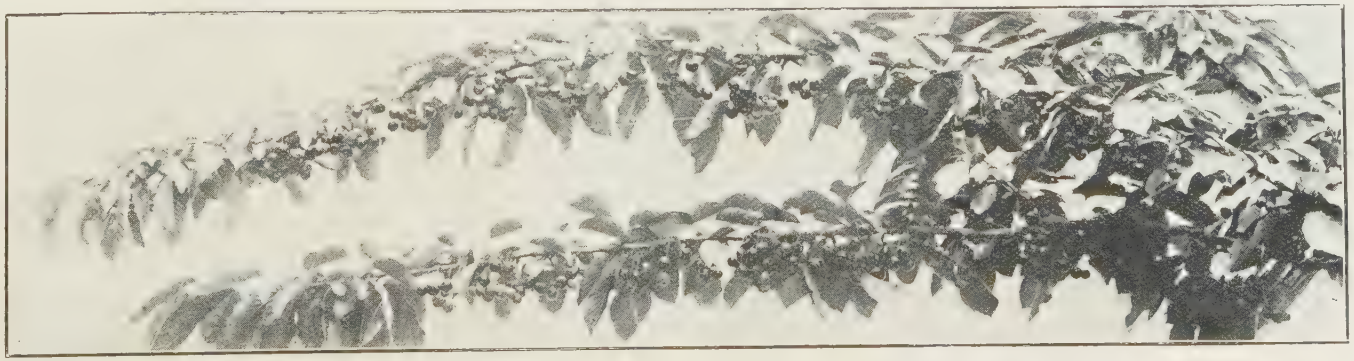
Planting.

Many growers advise planting the trees during the autumn, giving the roots of the trees a good chance to establish themselves in the soil during the winter, and thus being able to push out new roots during the early spring. This plan of autumn planting is good in districts where the winters are mild, but where the winters are inclined to be very dry and cold spring planting is preferable. Providing the land is in good tilth and every care and attention is given to the trees, there is no reason why they should not make a vigorous start after the spring planting. Should the trees arrive before the grower is ready for planting they should be "heeled in," and not be allowed to remain in the packing exposed to wind and weather for days, as is sometimes the case. Heeling-in simply consists of digging a deep trench into which the roots are placed. The trees should be placed, singly, side by side, spreading out the roots at the bottom of the trench. The loose soil taken from the trench is then thrown over the roots, covering them well so as to exclude all light and air. The treatment a cherry-tree receives when being planted has a great influence upon its future welfare. Some growers do not realize this, and at the end of a season or two they wonder why the tree has not done so well as anticipated. The simple operation of digging the hole into which the tree is to be planted does not receive the attention it should. It is advisable to dig a hole at least 3 ft. in diameter, and deep enough to allow the tree when planted to be a little lower than it stood in the nursery. This can be ascertained by looking at the earth-marks round the tree. Place the soil taken from the surface of the ground on one side, while that taken lower down can be placed in another pile. When the tree is placed in the centre of the hole, with the roots spread out in all directions, shovel back the top soil taken out first, working it well round the roots by means of the fingers, this being better than any subsoil for that purpose. After this is done



BLACK EAGLE.

Heavy cropper, but rather small. Fruit borne in very large clusters. Good commercial variety.



G. E. Shailer, photos.] BEDFORD PROLIFIC.

all the other soil can be thrown in and pressed firmly round the roots with the foot.

Cherry-trees should be planted 20 ft. by 20 ft., preferably on the square. This gives ample room for cultivation when the trees have grown to a good size.

Root Pruning.

The majority of cherry-trees when received from the nursery have part of their roots broken or bruised. To plant trees with roots in this condition is simply inviting trouble. Not only are they bruised and broken, but are often crowded and interlaced. Therefore before placing the trees in the orchard all bruised and broken roots should be carefully cut off and the interlacing ones thinned out considerably. The remaining roots will then be enabled to push out new rootlets as soon as they have become established in their new home.

Top Pruning.

Many growers who are almost expert at pruning the apple and pear find a stumbling-block when starting on the cherry. The long whippy growths every year are a source of trouble to them. First of all it must be decided what shape the tree is to take, whether of the "pyramid" style or the "open vase" shape. I think it is recognized by every grower that the "open vase" shape is the better for the successful growing of the cherry. As soon as the tree is planted pruning begins. If the tree is of the "whip-stick" type—that is, one straight stick—the first cutting is easy, the grower only having to determine the height he wishes to start the head, and cut accordingly. Should the tree be branched when planted, then I would advise cutting out all the branches misplaced, and reducing the others to three or four buds. Without going into the details of pruning it might be stated that for the first few years hard cutting during the winter should be practised, until a strong framework is built up. After the head is well formed, summer pruning gradually takes the place of the winter work, the grower removing any unnecessary and whippy growth of laterals, and spurring in. Any large cuts that are made should be painted over with oil or white-lead, to prevent gumming or the entrance of any fungus disease.

Varieties.

Before naming any varieties it might be just as well to mention the stocks on to which the majority of our cherry-trees are worked. These are the Mazzard and the Mahaleb. Cherries appear to do well on either stock, although for choice I think the Mazzard is

LATE DUKE.

Dark cherry, with flesh almost yellow. Very tart until fully ripe. Ripe over long period. Soft for packing.

G. E. Shailer, photos.]

BLACK TARTARIAN.

preferable, especially when it is intended to plant on land which is at all light. Trees worked on the Mazzard stock appear to produce a much harder wood than those worked on the Mahaleb, although it is quite free enough to give good quality to a heavy crop. With proper management of the soil the tree on the Mazzard stock grows to a good size, but not quite as large as trees worked on the Mahaleb. The fruit on the Mazzard stock is about four or five days later in maturing than on the Mahaleb in some districts. The soft growth of the Mahaleb is very liable to produce "gumming," especially in such varieties as Early Purple Guigne. When planting cherries for commercial purposes it is not advisable to plant too many varieties, but due consideration must be given to keep a constant supply through the season. The following list gives a few of the better varieties of cherries in their order of ripening :—

Early Purple Guigne : A fine, large, early cherry; crops well, but rather subject to gumming.

Belle d'Orleans : A rather pale cherry; tree very tender; good cropper.

Bigarreau Twyford : A good, large, early cherry.

Claremont : A very heavy cropping black cherry, good commercial variety.

Werder's Early : Good mid-season black cherry.

Black Tartarian : A good black cherry; crops well, but rather tender.

Bedford's Prolific : Very good, large, black cherry; good cropper; carries well.

Bigarreau Napoleon. Very heavy, late cropper; good canning variety.

Picking and Packing.

With the apple and pear crop a day or so makes very little difference when the picking season comes round, but not so with the cherry. Cherries picked before they are ripe usually shrivel up and have a very insipid taste, while if left to get overripe they soon decay, especially if being shipped any distance. Again, cherries should never be picked whilst wet, either from rain or heavy dew, this also causing decay and cracking after packing. It is for the grower to keep a good watch on his crop at picking time, and gather the crop as soon as the cherries are matured. Like other fruits, all the cherries on a tree do not ripen at the same time, consequently two or three pickings are required. Probably more care is necessary when picking cherries than any other of our fruits. Growing in large clusters, as they do, makes it a very easy matter destroying not only the fruit but the fruit-spurs. The use of long

THE BIGARREAU TWYFORD.

G. E. Shaidr, photo.

THE SAME TREE IN BLOSSOM.

G. E. Shailer, photo.]

pointed scissors for cherry-picking has come into great favour during the last few years, and I think it is very much better and quicker than the breaking of each stem with the finger and thumb, while the chance of destroying the fruit-spur is also done away with. Never take hold of the cherry itself when picking, for not only is the delicate bloom destroyed, but a cherry minus the stem is of no use for marketing purposes. Cherries after being picked should be allowed to cool before being packed, especially if the crop is being gathered during the heat of the day.

Very little trouble is usually taken in the packing of cherries. They are dumped into a half-bushel case and sent straight to market. Taking the necessary extra care is more than repaid by the better returns secured in consequence. When packing cherries the real top of the case should be nailed on first. This should be stencilled with the word "Top," so that there will be no mistake when opening up. Lining-paper is placed in the box, so that when the case is opened a neat appearance is presented. The first layer of cherries should be packed, or faced as it is usually called, with all the stems up, getting as many in as possible to prevent them shifting in transit. The case is then filled up with cherries in the ordinary way, lining-paper folded over, and the bottom of the case nailed on. A neat label, giving the variety of the fruit and the grower's name, adds to the general appearance and also advertises the fruit.

In America great use is made of the cherry-cartons. These are made of thin cardboard holding about a pound of cherries each. The front of the carton is open, showing the first layer of faced cherries, while the back is simply folded over, the top half fitting into the bottom half to prevent the cherries falling out. Eight of these cartons go to the case. The fruit shows up well in these packages, and arrives at its destination in good shape. They are very convenient for retail purposes, no weighing-out being required, as the cartons contain 1 lb. of fruit. The cartons are very cheap when bought in large quantities, and help to sell the fruit to much better advantage.

The half-case introduced lately by the Department might also be brought into good use for the packing of cherries. The measurements are 5 in. by $11\frac{1}{4}$ in. by $19\frac{3}{4}$ in. inside measurement, but I would advise an extra piece across the centre from side to side. This makes a much smaller surface for the first layer of faced cherries. In this case the cherries are not so deep as in the old-style half-bushel case, consequently there is much less pressure on the bottom layer, while the risk of heating is lessened considerably. Providing the cases are carried on the flat they should open up in first-class condition when placed on the market.

Pests and Diseases.

Very few pests and diseases attack the cherry as compared with those of some of our fruit-trees, in fact many growers state that the birds are by far the worst pests; but it is just as well to be able to detect the few pests and diseases that do attack this fruit, and know the method of control. Probably the most serious disease of the cherry is that known as "gummosis," or "gumming" as it is commonly called. This happens more or less on almost all varieties, but mostly on the more tender ones. It is easily detected by the gum which exudes through the bark, or from any wound or large cut. Very little is known of the direct cause of this disease, but most probably it is due to an excessive flow of sap during the spring-time. The cherry, being a great feeder, takes up moisture very greedily when this is available in the soil. This moisture may be greater then the foliage can dispose of, resulting in a rupture of the sap-cells where weakest, producing a pocket of sap between the cambium layer and the wood. This sap forces its way through the bark, forming a gum where exposed to the air. The best remedy is to pare off all the gum, and paint the affected part with white-lead.

During the last season or two many cherry-growers have been concerned about their fruit when this is about the size of a nut, the fruit turning brown, withering, and dropping in large quantities. Probably this was partly due to imperfect pollinization, as could easily be seen when cutting the fruit open, no seed or kernel being found. A disease known as *Monilia fructigena* or brown-rot attacks the cherry when about this size. Spraying the trees thoroughly in the winter-time with Bordeaux mixture, using 10-10-40 formula, as directed in the spraying leaflet of the Department, keeps this disease in check.

The only insect pest of any importance that attacks the cherry is the pear or cherry slug. Although primarily a pear insect, it is very common on cherry-trees. It is the larva of a fly, and is black and slimy in appearance, about $\frac{3}{8}$ in. long, and resembles a small garden slug. It feeds on the upper side of the leaves, often skeletonizing them. If allowed to go unchecked it ultimately causes serious damage to the trees, but as the slugs are easily controlled there is no excuse for such injury. Spraying with hellebore or arsenate of lead as soon as the slugs make their appearance is very effective.

Suitable moisture and temperature conditions in the soil are essential factors in profitable plant-production, not only to secure the desired absorption and assimilation of the plant-food in the soil, but even in the work of manufacturing that plant-food.

ESTABLISHING A BUSH FARM.

P. Barry.

In the back country of New Zealand there are men, having some experience of farming and of bush life, who by dint of persevering work and commendable enterprise have accumulated sufficient capital to warrant their taking up a bush section with the object of breaking it in and establishing themselves as independent farmers. To such men there are numerous chances in the hinterland of the North Island to carve out a home in the forest and attain thereby to a comfortable competence. To many of these, knowing the bush and its lore, the axe is as the pen to the author and the saw a means of cutting a way to fortune. They are the pioneers, who are one of the country's most valued assets, for it is only settlers of their type who are ready to endure the hardship of blazing a track for civilization and who are capable of converting the forest into productive agricultural country in a rapid and successful manner.

Their method of transforming the wilderness may be of advantage to others who without the necessary knowledge of bush craftsmanship have yet the desired determination and willingness to learn and profit by the experience of others. Let us take it that such a settler has accumulated the sum of £350 and has entered his name as a land-seeker at a ballot conducted under the land-for-settlements scheme; further, that he is among the lucky ones, and finds himself the possessor of 300 acres of virgin bush growing on fair average land, which when felled and grassed will be known to the pastoralist as good two-sheep country. With his £350 he has a pioneer's equipment—tent, saw, axe, and wedges—and, in addition, those best of all assets, a strong constitution and determination to succeed. Cutting a small clearing, he builds a tent and covers it with a "fly" of sacks, erecting a chimney of sods. This done, he takes his tools, and with a hired companion attacks the bush. His purpose in the first year is to fell and grass 60 acres of his holding. He commences in the month of June. He fells all timber under 3 ft. in diameter, because the heavier timber would, if felled, but waste the ground, for by reason of its size it would not burn

well. Should, too, the holding contain any matai this is also left standing if it be more than 18 in. in diameter, because experience has shown that large trees of this variety will not readily burn. After twelve weeks' work the settler has the satisfaction of seeing one-fifth of the bush felled and drying preparatory to a burn. In the meantime work must perforce cease, and the thrifty pioneer will seek employment from a neighbour and thereby augment his diminishing bank balance. By the end of December, given favourable weather, the fallen timber will be in good condition for burning. A warm sunny day with a moderate breeze blowing is chosen for this important operation, and with the assistance of two or three neighbours fires are kindled all along the windward side of the fall. Soon a volume of flame will be sweeping across the fallen bush, providing an appreciable amount of potash and clearing and preparing the land for utilization. When the soil has sufficiently cooled a mixture of grasses, with turnips, rape, and mustard, is sown. The settler will be guided in his choice of grasses by taking into account the quality of the soil and the local climatic conditions. An ordinary average mixture which would no doubt be suitable would contain at least English and Italian rye, cocksfoot, clovers, crested dogstail, and timothy. For further particulars the reader is referred to the article on the subject in the March issue of the *Journal*, by Mr. A. H. Cockayne, the Biologist of the Department. It is very inadvisable on a first sowing to stint the seed or to purchase seed of a cheap and inferior description. If the seed be stinted or if bad-quality seed be sown the land will almost invariably yield noxious growths instead of the useful plants desired.

The next step will be to fence the 60 acres which have been grassed, and for this purpose it may be advisable to enlist the aid of an experienced fencer. It is well to ring-fence that portion of the property which has been brought into use, because this will spread the fencing expenditure over a period of years and thereby save probable loss of sheep through straying, as well as obviate unnecessary shepherding.

When the turnips, &c., are ready for feeding off, 300 lambs (of decent quality and of a type found to be suitable to the locality) are purchased. The business of farming may then be said to be actually inaugurated.

The second year the same routine is followed, a further area of 60 acres being felled and grassed, fenced, and stocked. The third year an area of 90 acres is improved. This will give a pastoral area of 210 acres fit for utilization.

The question naturally arises, Can all this be done with a limited capital of £350? The following tabulated expenditure and receipts of our bush pioneer will show the proposition to be quite feasible :—

First Year.

Cr.	£	s.	d.	*Dr.*	£	s.	d.
Cash at bank	350	0	0	Half cost of felling 60 acres, at £1 15s. per acre*	52	10	0
Wages earned outside the holding	25	0	0	Seed of grasses, turnips, rape, and mustard, and packing, &c., for 60 acres, at 15s. per acre	45	0	0
				Material for 88 chains of fencing, at 6s. per chain	26	8	0
				Wages for fencing, at 8s. per chain	35	4	0
				Surveying 60 acres	2	10	0
				Provisions and sundries	50	0	0
				One year's rent, at 2s. 6d. per acre	37	10	0
				Rates and taxes	5	0	0
				300 lambs at 7s.†	105	0	0
				Balance	15	18	0
	£375	0	0		£375	0	0

* Half cost is debited because he does half labour himself.

† It is presumed that the yield of turnips, rape, &c., is a good one.

Second Year.

Cr.	£	s.	d.	*Dr.*	£	s.	d.
Balance	15	18	0	Half cost felling 60 acres, at £1 15s. per acre	52	10	0
Advance from Government Advances to Settlers	250	0	0	Seed, packing, &c., for 60 acres, at 15s. per acre	45	0	0
Wool off 285 hoggets at 8s. 6d. net*	35	12	6	Material for fencing 66 chains, at 6s. per chain	19	16	0
15 skins at 1s.	0	15	0	Wages for fencing, at 8s. per chain	26	8	0
285 hoggets at 12s., less commission at 5 per cent.	162	9	0	Cost of survey	2	10	0
				Provisions and sundries	50	0	0
				Rent	37	10	0
				Rates and taxes	5	0	0
				Interest on £250 at 4½ per cent.	11	5	0
				Whare	25	0	0
				Dip	20	0	0
				Horse, saddle, and bridle	15	0	0
				Dog	3	0	0
				Balance	151	15	6
	£464	14	6		£464	14	6

* Allowance for mortality, at 5s.

Third Year

Cr.	£	s.	d.	*Dr.*	£	s.	d.
Balance	151	15	6	500 lambs at 7s.	175	0	0
Wool-clip from 475 hoggets at 2s. 6d. net	59	7	6	Half cost of felling 90 acres, at £1 15s. per acre	78	15	0
475 hoggets at 12s., less commission	270	15	0	Seed, &c., for 90 acres, at 15s. per acre	67	10	0
25 skins at 1s.	1	5	0	Material for 63 chains fencing, at 6s. per chain	18	18	0
Balance	57	19	0	Wages for fencing 63 chains, at 8s.	25	4	0
				Cost of survey	3	0	0
				Rent	37	10	0
				Provisions and sundries	50	0	0
				Woolshed	55	0	0
				Rates and taxes	5	0	0
				Interest to Government Advances to Settlers	11	5	0
				Interest to auctioneering firm on £175 for twelve months at 8 per cent.	14	0	0
	£541	2	0		£541	2	0

FOURTH YEAR.

Cr.	£	s.	d.	*Dr.*	£	s.	d.
Advance on second mortgage ..	200	0	0	Balance	57	19	0
570 hoggets in wool at 14s., less commission	374	16	0	600 lambs at 8s.	240	0	0
30 skins at 1s.	1	10	0	Half cost of felling 90 acres, at £1 15s	78	15	0
				Rent	37	10	0
				Rates and taxes	5	0	0
				Survey	3	0	0
				Interest to Government Advances to Settlers	11	5	0
				Interest on second mortgage at 6 per cent.	12	0	0
				Interest on £240 to auctioneering firm at 8 per cent.	19	4	0
				Provisions and sundries	40	0	0
				Rescrubbing on the 90 acres of poor burn	25	0	0
				Balance	46	13	0
	£576	6	0		£576	6	0

FIFTH YEAR.

Cr.	£	s.	d.	*Dr.*	£	s.	d.
Balance	46	13	0	420 ewes at 10s.	210	0	0
Clip of 400 ewes at 5s.	100	0	0	9 rams at £2 5s.	20	5	0
Clip from 9 rams at 6s.	2	14	0	Sundries	40	0	0
200 lambs at 7s. 6d.	75	0	0	Rent	37	10	0
20 woolly skins at 4s.	4	0	0	Rates and taxes	5	0	0
Clip of 300 lambs at 10d.	12	10	0	Interest to Government Advances to Settlers	11	5	0
120 fat ewes at 15s.	90	10	0	Interest on second mortgage ..	12	0	0
100 fat lambs at 10s.	50	0	0	Interest on £230 5s. to auctioneer at 8 per cent.	18	8	4
				Balance	26	18	8
	£381	7	0		£381	7	0

It will now be interesting to analyse the settler's position, and so ascertain what he is worth after his five years' work. He has 210 acres of pastoral land, worth roughly £8 per acre for the goodwill. The writer has presumed that the good luck which so far favoured him has deserted him, and that he does not at the end of the fourth year obtain a burn. He has therefore an area of 90 acres which has yet to be burned and grassed, and consequently is only worth in its present condition about £4 per acre. He has 280 ewes and 9 rams, worth roughly £158. Added together these amounts show a sum which amply repays him for his labour.

	£	s.	d.
210 acres at £8 per acre	1,680	0	0
90 acres at £4 per acre	360	0	0
Sheep	158	0	0
By cash at bank	26	18	8
Total	£2,224	18	8

As against this amount he carries a first and second mortgage of £250 and £200 respectively, the interest on which, together with his regular rent, amounts to 4s. per acre on the holding. He is now in a position to build himself a comfortable home and live as no doubt he is entitled after such an arduous period as his five years spent in reclaiming the wilds.

GRAPE-CULTURE.

POSITION OF THE WINE-PRODUCTION VINEYARDS OF THE DOMINION.

S. F. Anderson.

That grapes may be cultivated with success in the open in many situations of the Dominion, especially in Hawke's Bay and in the more northerly districts of the North Island, has been amply demonstrated. Not only are table-grapes of a high quality being produced, but grapes for wine-making purposes are being grown on a commercial scale; indeed, the wine-making industry of the Dominion has now become established on a fairly successful footing. A description of the more important vineyards will give some idea of the extent of grape-growing in this country and the confidence vignerons are exhibiting in their industry.

The work of establishing a vineyard is a very different matter from the establishment of an orchard. Many—I might say all—of the vineyards now being successfully worked have been more or less replanted not only on the phylloxera-resistant stocks, but with varieties that had to be proved suitable to their several localities before being finally chosen for permanent growth. Preconceived ideas of what vines are the best to grow are very hard to get rid of. In my twenty-two years' experience among the vines in this Dominion I have met with many starting in viticulture who had such set ideas on this subject that not until their failure had proved to them that certain varieties are not suitable to our conditions have they finally settled on the best kinds for their locality. This is only one cause among others that have hitherto prevented the placing of better wines on the market. Then comes the wine-making itself. There is much to be learned in the cellar. Only those who have the knowledge and capital are able to provide the necessary appliances in the way of buildings and machinery, so that the wine can be made, stored, and blended, and also in order to control the conditions for fermentation and prevent at such time bad contacts caused by dirty surroundings. Wine is very susceptible to such, especially during warm weather. These are some of the difficulties to be met and overcome when going into the industry.

The difficulties in growing the grape for wine are not greater than those met with by the grower of other fruits, nor are they greater than those met with by vine-growers on the Continent of Europe. From the experience now gained on the vineyards mentioned in this report, and the application of right principles of culture, control of disease, and the making of wine, it can now be confidently affirmed that the business of vine-growing and wine-making in the suitable parts of the North Island is a profitable industry for those who can find the necessary capital. The approximate cost per acre to work an established vineyard is £38 per annum. This includes the making of the wine as well as the cellar-work and the maintaining of the vineyard in a high state of cultivation. Much lower estimates than this, I know, have been given, but they cannot be relied on. The foregoing is from a vineyard which has been established for seventeen years.

The amount of saccharine obtained in the grape, upon which depends the alcoholic strength and, consequently, the keeping-qualities of the wine, is ruled by — (1.) The degree of ripeness attained by the grapes. The grapes at Waerenga and Hawke's Bay are generally perfectly matured by the end of March. Varieties which are not ripe by that time in an ordinary season should not be grown. Variations in seasons have, of course, to be allowed for. (2.) Weather-conditions. (3.) The system of pruning and training has a considerable effect on the amount of saccharine gained by the grape. The system followed at Waerenga Farm is the best known for growing the wine-grape in this Dominion. It is known as the "double Guyot." (4.) Keeping the soil in a high state of cultivation, and training the fruit-bearing rods not more than a foot from the ground. The heat radiated from a cleanly kept soil surface brings about similar conditions to those existing when fruit is grown against walls. It has the still further good effect of giving a greater resistance to mildew.

Waerenga Experimental Farm Vineyard.

Geographical Position. — Sir W. J. Hooker gives the range of latitude the vine will grow in as from the 36th to the 48th, but in a country like New Zealand, where the temperature and humidity is so different from that of a continent, the vine cannot be grown successfully out of doors south of the 40th line of latitude. Waerenga Farm is situated between the 37th and the 38th.

The Soil and General Contour of Country.—The vineyard is situated on undulating hills facing the north, the distance from the sea on the west coast being about forty miles and the east fifty miles,

and fifty-four miles from Auckland. The soil is known generally as poor gum-land, the natural vegetation being tea-tree, fern, and tauhinu, the growth not exceeding 4 ft.

The formation of the country, as given in the report by the Manager of the farm, Mr. J. F. Shepherd, on boring for water, is "drift clay, sand, papa, brown fireclay, and ironstone." This land, although wanting in those substances which go to make up good soil, is mentioned by Mr. R. C. Aston, F.I.C., F.C.S., in his report for 1909, page 468, as containing an "abnormally large quantity of potash." By thorough drainage, aeration, and working this poor soil is capable of becoming good vine-growing land. When aided by such manures as bonedust, blood and bone, superphosphate, and basic slag fine results are obtained, but from the above showing this soil does not require potash manures. The clayey nature of the soil is excellent for imparting good colour to the wine, and, as this clay extends many feet down, there will always be plenty working to the surface.

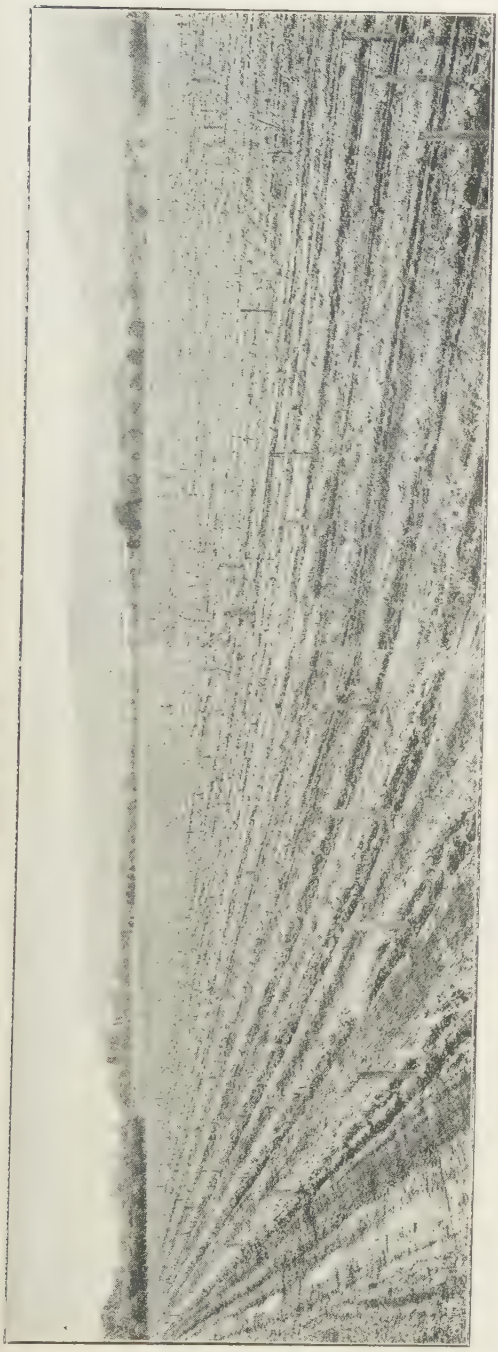
The Rainfall.—The rainfall for the months of January, February, March, and April is slightly heavier than that of Auckland, the average being, respectively, 4·86 in., 3·39 in., 4·52 in., and 3·85 in. for three years—namely, 1906, 1907, and 1908. The rainfall at Waerenga for January, 1907, included in the above, was unprecedented, being 13 in., and causing washouts on the line of railway that stopped traffic for a fortnight.

The Disease and Pest Troubles.—The chief drawback, and the most expensive, to vine-culture north of Tauranga is black-spot (*Glœosporium ampelophagnum*). In few places in the north it is worse than at Waerenga, but systematic and timely application of the Bordeaux mixture has generally controlled it. Mildew (*Oidium Tuckerii*), the chief trouble south of Tauranga, is not met with here so much. The birds are a great trouble in all vineyards, and are no exception at Waerenga. They are kept down by shooting.

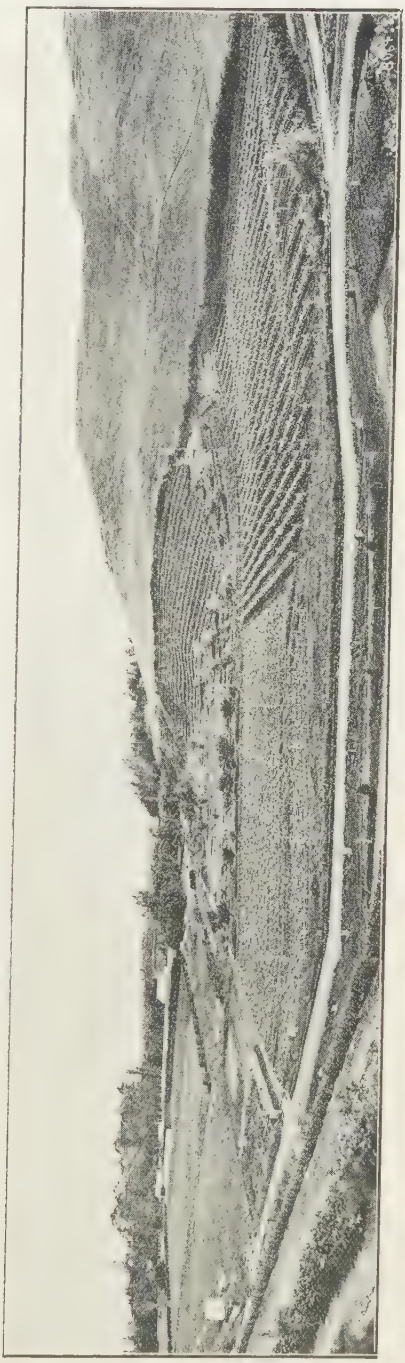
The Manures used and Cost per Acre.—The land has been limed about once in seven years, and the manures used have been those already stated. The cost has been about 15s. per acre per annum.

Distance the Vines are apart and the Cost of Espalier Fence.—The vines are planted 8 by 8, so that the espalier fences of three wires high occur every 8 ft., and cost about 6s. per chain for material and labour. The cost for putting fences to 10 acres, allowing a little for head land and cross road, would be approximately £24 per acre.

The *varieties* grown are: Cabernet, Sauvignon, Shiraz or Hermitage, Pinots Meunier and Noir, for dark wines; Riesling, Verdeilho,



The Vineyard of Mrs. A. M. Randall, Greenmeadows, Hawke's Bay.



The Vineyard of the Catholic Mission, Greenmeadows, Hawke's Bay.

S. B. Taylor, photos.]

Pedro Ximenes, for light-coloured. There are others, such as Albany Surprise, Black Hamburg, and some Americans, such as Iona, Allen's Hybrid, &c., that are grown for demonstration purposes.

The Classes of Wine made.—The wines made have been claret, burgundy, and sweet dark wine. Riesling, Pedro Ximenes, and Verdeilho make the hock and chablis class of the white wines. Owing to their excellent quality and undoubted purity the demand for these wines is improving every year.

Phylloxera-resistant Stocks used.—After many years' trial, not only in the Waerenga Vineyard but in all parts of the North Island, for outdoor-grown vines, and also as stocks for vines under glass, the *Mourvedre rupestris* has proved the best. The *Riparia rupestris* runs it pretty closely at Waerenga Experimental Farm.

The alcoholic strength of wines varies with the saccharine obtained in the grapes, and that depends on the weather-conditions at the ripening period. It runs from 16 to 24 per cent. of natural sugar in the fruit. The average alcoholic strength, however, is from 10 to 12 per cent. of absolute alcohol by volume.

Area of Vineyard.—The area under vines is 20 acres. The vineyard has just come into full bearing, although vines have been growing here since 1897. Owing to a great deal of the work being experimental in both vine-growing and wine-making, it has been only within the last few years that the present vineyard has become properly established as regards both the varieties of grapes and the phylloxera-resistant stocks. It is now the visiting-ground for seeing practical demonstrations in vine-growing and wine-making for the northern districts.

Yield of Grapes per Acre.—The yield of grapes for wine-making has always been good at Waerenga. The last vintage reached 475 gallons per acre. This is 9,500 gallons. Valuing this as low as 2s. 6d. per gallon shows an annual income of £1,167 10s.

The climate at the Waerenga Experimental Farm does not offer the best conditions for viticulture. The success attained is the result of the scientific and careful methods used in controlling disease and of good culture under the present Manager, Mr. J. F. Shepherd, and the long experience in viticulture of his cellarman and overseer of the vineyard, Mr. James Andrews. The Waerenga Experimental Farm may be taken as a fair basis for calculating the prospects for those entering upon the viticultural industry.

Viticulture in Hawke's Bay.

In the important conditions of climate, soil, and rainfall the southern and coastal parts of Hawke's Bay undoubtedly possess the greatest advantages for vine-growing in the Dominion.

THE VINEYARD OF THE WAERENGA EXPERIMENTAL FARM, WAIKATO.

S. B. Taylor, photos.] THE VITICULTURAL SECTION OF THE ARATAKI EXPERIMENTAL FARM, HAWKE'S BAY.

The fine vineyard of 35 acres situated at Te Mata, Havelock North, owned by Mr. Bernard Chambers, is now the leading one of the Dominion. It is situated near the Township of Havelock North. Geographically placed, it comes between the 39th and 40th lines of latitude, and is on the 177th meridian of longitude. It is only about three miles from the east coast. The soil of this vineyard differs widely from that of the Waerenga Experimental Farm vineyard in the Waikato. It also differs considerably in parts of the vineyard itself. One is a light loam overlying an ironstone gravel, and the other a more clayey soil overlying a cement. It is situated from 150 ft. to 200 ft. above sea-level. The rainfall for the months of January, February, March, and April, taking an average of twenty-one years, is 2·14 in., 2·66 in., 2·85 in., and 2·99 in. The average annual rainfall for the same period is 31·78 in. It has the lightest rainfall and greatest number of sunny days of any district in the North Island. The chief troubles are birds and mildew (*Oidium Tuckerii*). The latter is quite controlled by the use of sulphur.

The only manure—if it can be so termed—used in this vineyard has been lime.

The vines are planted 7 by 7 and 6 by 6, and the cost of the espalier trellises has been 5s. per chain.

The varieties of grapes grown are: Cabernet Sauvignon, Shiraz, Pinot Meunier, Riesling, and Verdeilho. Owing to the drier climate, the yield per acre on this class of land is perhaps not quite so high as in some other localities, but the keeping-qualities of the wine are enhanced thereby. Mr. Chambers's wines are principally hocks, claret, and sweet, and are commanding a large sale. Only a portion of this vineyard is on resistant stock, the more recently planted section being on the *Mourvedre rupestris*.

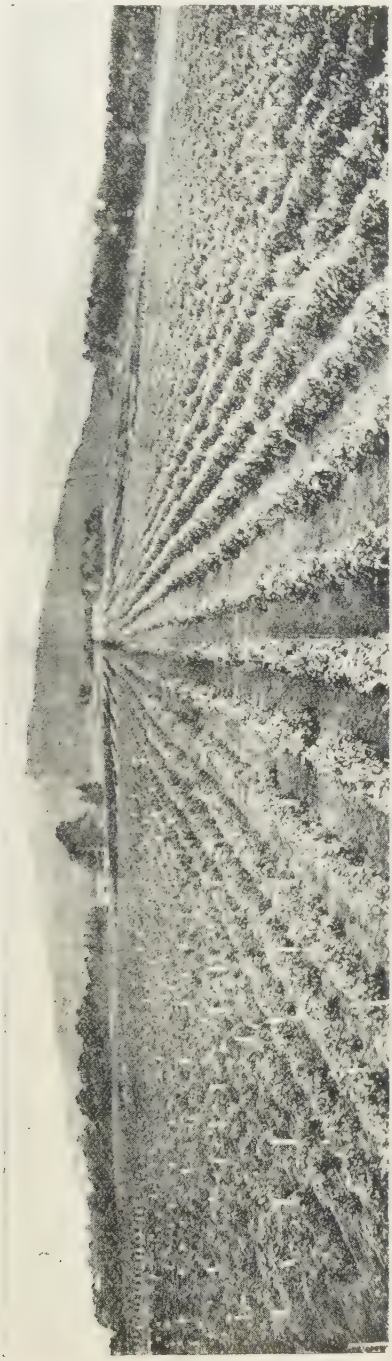
The approximate cost per acre of working this vineyard is under the general estimate given above—viz., £38. The amount of saccharine obtained is from 18 to 22, by the Guyot glucometre.

The years of good vintages amount to more than four in five—nearly five in five.

The Greenmeadows Vineyard.

This has now been established twenty-two years. To a great extent it has been an experimental vineyard, by which nearly all the others have been more or less benefited—at any rate, prior to the establishment of Waerenga and Arataki experimental vineyards. At Greenmeadows the late Mr. H. S. Tiffen, who was an enthusiast in horticulture, spared no expense in experimental work with outdoor vines and fruit-trees, and also in wine-making. The work is

now carried on by Mrs. A. M. Randall. The area in vines is about 15 acres. Although situated on the flat, the shingly subsoil rendered the conditions much more suitable for vines than is generally met with on flat land. The soil is a sandy loam, with sand overlying shingle that varies from 3 ft. to 6 ft. in depth from the surface. There is no clay. The rainfall here is slightly heavier than at Te Mata. The record kept by the reverend fathers at the mission vineyard close by for the months given above is: January, 1·48 in.; February, 3·45 in.; March, 5·35 in.; and April, 3·28 in.; and the average annual fall, 34·78 in. The principal pests are mildew, some black-spot, and birds.



The Vineyard of Mr. Bernard Chambers, Te Mata, Hawke's Bay.

No manure was used on this vineyard for thirteen years other than ashes and spreading between the vines the refuse material from the wine. Since that time lime has been applied. Artificial manures and the ploughing-in of green crops have also been adopted. This last mentioned has proved a great success. The espalier trellising is of a much more substantial nature, and cost more than is usually spent in that way at the present time.

The vines were all planted 9 by 8, the trellises being 9 ft. apart.

The press-house and cellar is one of the best equipped in the Dominion.

A large number of varieties of vines have been fruited in this vineyard, but are now reduced to Pinots (Meunier, Noir, and Chardonay), Cabernet Sauvignon, Black Hamburg, Pedro Ximenes, Golden Chasselas, and the American Iona, Allen's Hybrid, and Albany Surprise. Two rows of Pinot Chardonay, grown on the *en-chaintre* system, have borne enormously. The varieties of wine made are of the claret, burgundy, and bordeaux types, and a hock and chablis from the white grapes. A sweet wine is also made. The yield per acre may be stated at 300 gallons. Could the depredations of birds be controlled, it is possible this might be nearly doubled.

This vineyard was originally planted with vines on their own roots, but many are now on the phylloxera-resistant stocks.

The amount of saccharine obtained in the fruit on this vineyard has always been good, reaching in dry autumns as high as 24 per cent. The average is about 20 per cent. I have been informed that the wine made at this vineyard is commanding a ready sale.

Mr. B. Steinmetz's Vineyard.

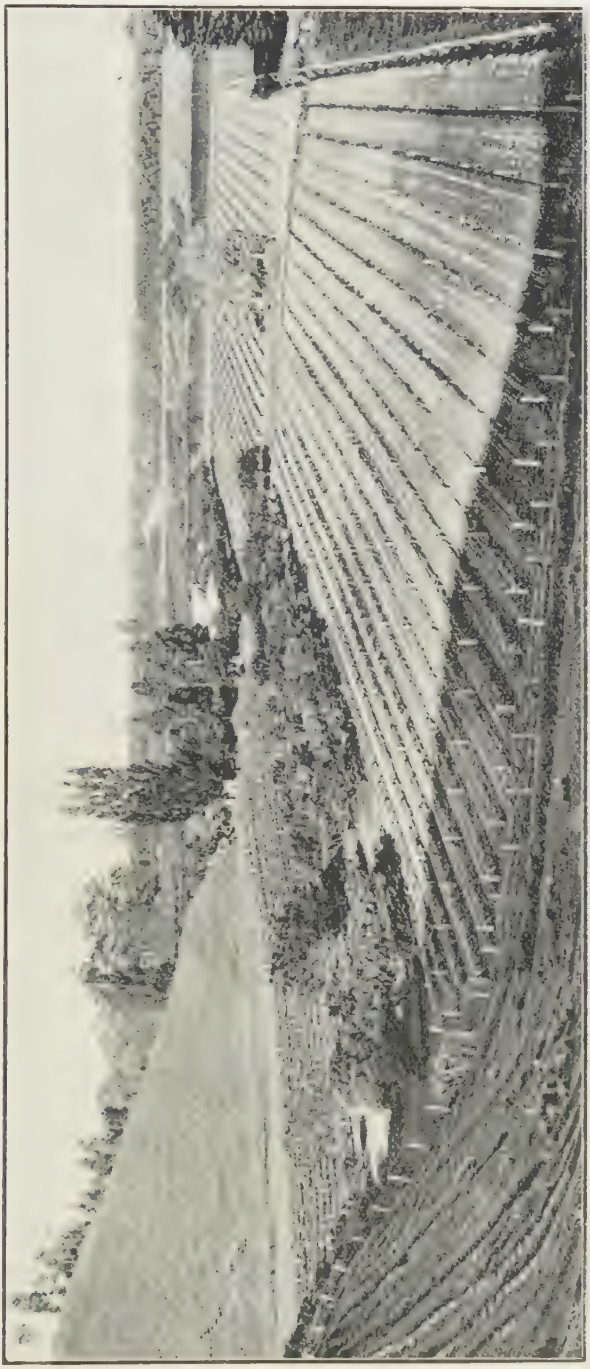
This is situated immediately opposite the Greenmeadows Vineyard, and is one of the best kept in the Dominion. It is close under the Pukekuri Hill, and the soil is better than that farther out on the plain. We have in this vineyard of 4 acres a fair specimen of what can be done by intense cultivation and good management, which is more than justified by the returns obtained. The yield of grapes enables the proprietor to make from 2,300 to 2,500 gallons of wine, besides selling a large quantity of table-grapes annually.

This vineyard has been established for seventeen years. The conditions mentioned in the description given of the Greenmeadows Vineyard apply in a general way to Mr. Steinmetz's vineyard, as they have only a roadway dividing them. He can sell all the wine he makes.

The Mission Vineyard.

The Roman Catholic Mission Vineyard is situated partly on the hills and partly on the flat land surrounding the Maryvale College, and close to the two vineyards just described. This vineyard is another model of good management and high culture, and the wine made is of a high class. The wine-cellar is as perfect as good order and cleanliness can make it.

Vine-growing and wine-making has been carried on by the mission fathers at Meeanee, and later on at this vineyard, for over



S. B. Taylor, photo. THE VINEYARD OF MR. B. STEINMETZ, GREENMEADOWS, HAWKE'S BAY.

fifty years. Many of the fathers and brothers connected with the mission, bringing expert knowledge from the Continent and with years of local experience, have been enabled to make wine very highly commended by French and other experts. They have not been backward in availing themselves of the improved machinery now used in wine-making. It has been interesting to note these changes from the primitive methods used in the earlier vintage days by the mission fathers to those now practised. All the improvements are in the direction of cleanliness and the control of good fermentation, clearing, blending, and good-keeping of the wines made. The climatic and other conditions mentioned in the report on Greenmeadows and Mr. Steinmetz's vineyards apply also in this instance.

North Auckland.

There are many suitable sites for vineyards to be found in the various districts throughout the counties north of Auckland. Although situated between the 34th and 35th lines of latitude in the extreme north and the 37th at Auckland, and similar in latitude to wine-making districts of Australia, the insular position and physical features render the conditions very different from the Commonwealth.

The rainfall—for the first four months of the year—most favourable for wine-grapes occurs at Helensville, Whakapirau, Bay of Islands, Whangaroa, and Mangonui. The district for some distance round Whangarei is not favourable.

Among the North of Auckland vineyards producing good wine and well-grown table-grapes is that of Mr. A. A. Corban, Mount Lebanon, at Henderson. The Black Hamburg is grown here to great perfection. Mr. Corban's system of protecting from the ravages of birds by wire netting, although expensive in the first outlay, is quite effective, and enables him to place on the market fruit which can compete with that grown under glass. He has recently doubled the size of his vineyard.

Mr. W. H. Jackman has a productive 5 acres of wine-grapes growing at Whakapirau. He is now making a considerable quantity of wine of good quality. Mr. Jackman has now been a vine-grower for many years. He was one of the early growers who had his vineyard devastated with phylloxera, and had to replant with vines on the resistant stocks. This district has produced some of the best wine, the Verdeilho and Riesling attaining 14·50 per cent., Cabernet Sauvignon 13·25 per cent., and Shiraz 13 per cent. in volume of alcohol.

Mr. Norman May, of the Hupara Vineyard, Kawakawa, has been making wine for a good many years. Like others in the north, he has met reverses in the way of phylloxera, and has been obliged to replant on resistant stocks. His press-house and cellar equipment is good and a credit to his ingenuity and resourcefulness. He turns out a good wine, for which there is a ready sale. His land has been heavy bush, and consists of a clayey loam, on which the vines do remarkably well. Situated at some 300 ft. above the sea, on a hill not too steep to work with horses, it appears an ideal situation for vines.

Still farther north, at Herekino, are the vineyards of Messrs. J. Bacich, T. Kumicich, S. Urlich, T. Lunyevich, and G. Veza—all Austrians. The Pinot Gris is grown here very successfully. All of these vineyards are doing remarkably well.

There are many Austrians at Waikumete, Oratia, Henderson, Swanson, Red Hill, Tekopuru, and at the Thames. The Austrians are most persevering in their efforts as viticulturists wherever they have started. Many are living on some of the poorest gum land, and have been content to make a bare living by gum-digging and outside labour so long as they could get in a day or two a week in their vineyards. Those who had the capital have spent as much as £40 per acre on deep-trenching their ground. Many of them have brought long experience in viticulture from their own country, and regard the conditions for vine-growing as being sufficiently good to induce them to put their capital and work into it.

For the reason given in introducing this article it would be a difficult matter to state the amount of labour and capital expended in establishing viticulture in this Dominion. Owing to mistaken advice many persons entered upon the industry without due consideration of the locality being suitable and the capital required. From the invasion of many of the vineyards by the phylloxera many promising starts fell through.

It has now been amply proved that the country is capable of producing light wholesome wines. We have had from time to time the testimony of medical and other authorities that the consumption of this class of wine is healthy, and in many cases beneficial. Also from a temperance point of view, where this class of wine is used as a beverage, there is not a tendency to excessive drinking. There are now 376 acres in the Dominion devoted to wine-making, producing, as shown in my returns, 89,400 gallons of wine, of the value of £11,175, at the exceptionally conservative

price of 2s. 6d. per gallon. That this progress is being made is a further indication of its being, where properly carried on, a profitable industry.

NOTE.—The frontispiece of this number is a photograph of a portion of the vineyard of Mr. A. A. Corban, Henderson, Auckland.

It would be very hard for the most enlightened and scientific expert to show the farmer how to improve his business. His actual husbandry is generally above reproach. . . . His choice of seeds and manures is sound, if somewhat traditional and conservative, and the feeding of his stock is not susceptible to any revolutionary reform.—*A. D. Hall, F.R.S., formerly Director Rothamsted Experimental Station, England.*

I believe that the country, which God made, is more beautiful than the city, which man made; that life out of doors and in touch with the earth is the natural life of man. I believe that work is work wherever we find it, but that work with nature is more inspiring than work with the most intricate machinery. I believe that the dignity of labour depends not on what you do, but how you do it; that opportunity comes to a boy on the farm as often as to a boy in the city; that life is larger, and freer, and happier on the farm than in the town; that my success depends not upon my location, but upon myself—not upon my dreams, but upon what I actually do—not upon luck, but upon pluck. I believe in working when you work and playing when you play, and in giving and demanding a square deal in every act of life.—*Edwin Osgood Grover.*

C. E. Cuming, photo.] THE CELLAR AT WAERENGA EXPERIMENTAL FARM.

INKWEED.

R. J. Hamilton, M.A., B.Sc., Karangahake.

In looking through the October, 1913, issue of the *Journal* I saw some statements about inkweed which do not fit in with my knowledge of the plant. I lived in the Northern Wairoa for some nine years, and on all new burns and bush clearings inkweed was the most common plant. It came up after every burn, and, unless the land was stocked, killed out the grasses and clovers which had been sown. It was everywhere where bush had been, so that I had ample opportunities of observing it.

Sheep eat it with relish when the plants are young, and thrive on it. They will even gnaw the stems right down to the ground. When the plants are older the farmers—Mr. Trounson, of the Land Board, for one—stock the land very heavily with sheep or cattle to break it down.

Cattle do not seem to relish it as much as sheep do, but they eat the young plants, and, as already observed, can be made to eat the large plants, which sometimes grow to a height of 6 ft.

Birds eat the berries, and some—pheasants and quail—prefer them to any other food. The pheasants fly down to the ink-berry patch in the morning for breakfast, return later for dinner, and last thing before going to roost. They thrive on it, for the pheasants of the Northern Wairoa are only equalled by those of the maize districts of the Bay of Plenty. When shot their crops are full of ink-berries. During my stay there I shot about a thousand, perhaps more, and fully 80 per cent. had fed on ink-berries. Their crops were distended with the fruit; their flesh was sometimes stained with it, but they were always fat and vigorous, and were excellent eating.

Blight-birds, blackbirds, and thrushes also feed largely on the berry.

Fowls during the time when the berries are ripe spend most of their time around the plants if any are growing near the homesteads.

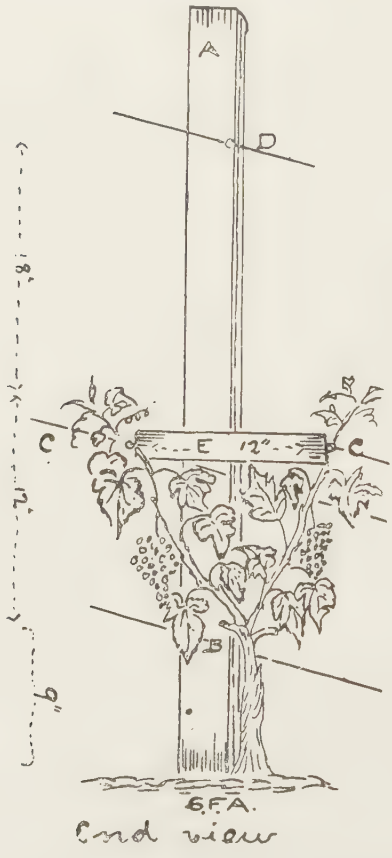
During the whole of my stay in the Wairoa I never heard of any beast or bird that was injured by eating the inkweed. They all seemed to thrive, even when they lived almost entirely on it or its berries.

TRAINING SOME OUTDOOR GRAPE-VINES:

AN IMPROVED METHOD.

S. F. Anderson.

The following method of training the fruiting-shoots of the European varieties of table-grapes practised by Mr. Luke Willis, of Taradale, Hawke's Bay, should recommend itself to growers: Trained on the ordinary double Guyot system to an espalier fence of three wires, he improves on that method by having a cross-piece of wood about 2 in. by 2 in. and 12 in. long nailed to the post 21 in. above the level of the soil. This is nailed to the post so that the half of its length projects on the side on which the vine is growing, as shown in the illustration herewith. In carrying out this method two wires are used in place of the single wire usually employed —one at each end of the cross-piece. The fruiting-rod is trained to the bottom wire in the ordinary way, and as the shoots bearing the fruit grow up they are tied alternately to the wires on either side of the cross-piece mentioned above, each shoot sloping outward. The advantages of this method are: There is no crowding of the shoots, while increasing the facility in tying, spraying, and sulphuring; it is also an easy matter to select the best bunch to each shoot and cut the secondary ones away, as every one hangs clear but at the same time well protected by the foliage. This is a consideration in growing table-grapes. The most important advantage of the method is that the fruit, hanging clear of the foliage, can dry rapidly



A, post; B, bottom wire; C, C, two wires on same level stapled to end of stretcher; D, top wire for training rods along; E, strretcher or crosspiece.

in showery seasons. If the bottom wire is kept 9 in. from the ground and the cross-piece a foot above that, the small-meshed wire netting to keep off the birds could be used as described in the issue of the *Journal* for February.

FEEDING THE CALF:

THE RUAKURA METHOD.

This season's calves at the Ruakura Farm of Instruction have developed remarkably well, indicating that the treatment adopted is successful. Whole milk is fed for the first four weeks, when skim-milk is gradually substituted, the exchange being made at the rate of a pint a day. To make good the loss of butter-fat, pure, dry, crushed linseed is added to the skim-milk, commencing with about a teaspoonful and gradually increasing the supply as the whole milk is withdrawn until two levelled tablespoonfuls of the meal are added to the skim-milk morning and evening. At the same time the calf is educated to eat dry crushed oats, which are given when the calf is about three weeks old, at which age it will have commenced to chew the cud. The oats are fed only in very small quantities, commencing with a small handful and increasing at a very gradual rate till at about four months old, when the calf would be ready to be taken off the fortified skim-milk diet, and four good handfuls would be given. In the case of a stud bull the oat ration is doubled at about this age. A few weeks before the skim-milk is discontinued a little chaff is mixed with the oats, so that when the skim-milk is withdrawn the calf will be accustomed to this ration. The crushed linseed is, of course, added to the chaff and crushed oats when the milk is withdrawn. The stud calves at this time are allowed a moderate supply of sweet hay. As the colder weather approaches, roots are pulped and added to the oat, chaff, and linseed ration. At this time each calf would be receiving night and morning about half a bucketful of prepared food. Some calves will eat more than others; and here it is where the value of a careful and observant attendant comes in, as, noting variations in appetite, he will feed the calves according to their individual requirements. Apart from the small amount of linseed given in the skim-milk, all the special feed is provided in a dry condition. From the second day of the calf's life, onwards through the milk and skim-milk diet stage, a pinch (about a saltspoonful) of carbonate of soda is added to the liquid. Rock-salt and good drinking-water are always before the young stock.

AGRICULTURE ABROAD.

ELECTRICITY IN AGRICULTURE.

The following account of the origin and progress of the work of stimulating plant-life by electricity formed part of the Fifth Kelvin Lecture, delivered by Sir Oliver Lodge, D.Sc., F.R.S., before the Institution of Electrical Engineers in London in January of this year :—

In order to convey supplementary information to those interested in the subject of electrification of crops, and in order to answer many questions and make the lecture more complete, I hope it is permissible here to reproduce the substance of a pamphlet which I wrote and privately printed in or about 1908, and which is not otherwise accessible.

Some thirty years ago a Swedish professor named Lemström sought to elucidate the aurora borealis by trying to imitate its appearance by electrical experiments. For this purpose he produced high-tension discharges of various kinds, and sent them through vacuum tubes until he got an appearance very like those of the northern lights. Some of these experiments he conducted in his greenhouse, and he noticed incidentally that the plants seemed to thrive under the treatment, and that the electrification thus produced in their neighbourhood appeared to do them good. He also noticed as remarkable the flourishing development of plants in Arctic regions, where the sunlight was very weak; and he attributed part of this growth to the influence of electric discharges.

He says that when the plants in the north of Norway, Spitzbergen, and Finnish Lapland have resisted the frequently destructive night frosts they show a degree of development which greatly surpasses that of plants in more southern regions, where the climatic conditions are more advantageous. This rich development appears principally in the fresh and clear colours of the flowers, in their strong perfume, in the rapid development of the leaves on the trees, and their scent; but particularly in the rich harvest which different seeds—such as rye, oats, and barley —will produce, when, as before stated, they are not destroyed by the frosts. From a bushel of rye sown they will often produce 40 bushels, and from barley 20 bushels, and so forth. It is the same with grass. These results are attained although the people cultivate their soil very imperfectly, using only ploughs and harrows of wood.

He pursued the matter by careful observation, taking test plants in pairs or groups, electrifying one group—that is to say, discharging some electricity into the air above them—and keeping a similar group away from the electricity in order to be able to compare them. Then he photographed the two groups side by side, and found in nearly all cases a marked improvement as the result of the electrical treatment. He concluded that the needle-like shape of the leaves in fir-trees and the beard on the ears of most cereals have the discharge of electricity as their function, and finds that they do act in this way.

This observation and these experiments of Professor Lemström were not, indeed, the beginning of the application of electricity to plant-growth, because pioneer attempts had been made long before, as will be mentioned directly, but it was the beginning of a thorough and scientific treatment of the problem. Attempts of a different kind had also been made. Plates had been sunk in the ground, and a current passed between them among the roots of plants; but whatever effect is thus caused is of a totally different kind to that excited by high-tension electricity supplied to the air above them. Both in a manner are natural processes.

There are natural earth-currents, and these must flow among the roots of plants, though whether they produce an appreciable effect may be doubted.

There is a natural atmospheric electrification, and this must be playing an important part in many phenomena. Atmospheric electrification is responsible for the formation of rain and hail. During fine weather the electricity in the air is usually of one sign: mainly positive. When wet weather sets in, the electricity in the air usually changes sign, becoming negative. The whole subject is a large one; a great deal is known about it, and vastly more remains to be known; but meanwhile it can hardly be doubted that the electrification of the air has some effect on growing plants. For it is found that, under the influence of sunshine, electrified plants can give off electricity from the leaves; and the fact that the air is naturally electrified relatively to the soil causes all plants to be electrified too, so that in all probability they are in a constant state of slow electrical discharge, which becomes more rapid when the sun is up. In what way this discharge of electricity from their growing tips, and hair, and surface generally really acts must be studied and reported on by physiological botanists; but it is natural to suppose that it cannot be without influence, and reasonable to think that the influence may be beneficial—a hypothesis which direct experiment confirms.

Possibly, in some sunny countries the effect is excessive, and might with advantage be moderated; but in this climate it turns out that artificial supply of electricity does increase the rapidity and assist the amount of growth. At any rate, the experiments of Lemström, which were repeated and extended by others, clearly pointed in that direction. So when, after some preliminary experiments at Bitton, Mr. J. E. Newman, of Gloucester, acting in conjunction with Mr. R. Bomford, of Salford Priors, determined to try the phenomena on a really large scale, and came to me to see if I could help them electrically, and enable them to maintain a continuous high-tension discharge for hours together each day over 10 or 11 acres by means of power furnished by an oil-engine and dynamo, I very willingly assented, and set my son, Mr. Lionel Lodge, upon the job.

The method is to stretch over the field to be treated a number of wires on poles, something like low telegraph wires, but high enough for loaded wagons and all the usual farming operations to go on underneath the wires without let or hindrance. The wires are quite thin, and are supported by a few posts in long parallel spans, about 30 ft. apart. They are supported on the posts by elaborate high-tension insulators, and they extend over all the acreage under experiment, a control plot of similar land under similar conditions being, of course, left without any wires.

The system of conductors is then connected at one post with a generator supplying positive electricity at a potential of something like 100,000 volts, and with sufficient power to maintain a constant supply of electricity at this kind of potential.

Leakage immediately begins, and the charge fizzes off from the wires with a sound which is sometimes audible, and with a glow just visible in the dark. Any one walking about below the wires can sometimes feel the effect on the hair of the head, as of a cobweb on the face. They are then feeling the stimulating action of the electrification.

The electrification is maintained for some hours each day, but is shut off at night: it is probably only necessary to supply it during the early morning hours in summer-time, and in spring-time or in cold cloudy weather for the whole day. In bright sunshine it seems unnecessary or even harmful. But at what stages of the growth of a plant the stimulus is most effective has still to be made out; probably the earlier the better. And since, in the case of wheat, both the ear and the straw is valuable, the electrification should be applied for a time each day during the whole period of growth until stooling begins.

The power required to generate the electricity is very small, for, although the potential is high, the quantity is insignificant and the energy is accordingly comparatively trivial. It is known that even when natural atmospheric electricity has accumulated intensely and has become a thunderstorm, the quantity even then is quite small, though the potential or tension is so enormous that the flashes are of astonishing violence and power while they last.

The electricity can be generated in more than one way. It can be generated by the revolving glass plates of a static-influence machine, usually known in this country as a Wimshurst machine; or it can be generated by transforming up

to high tension, and rectifying to one direction, the current of the revolving magnetic generator called a dynamo. The first is in many respects the simplest, and was used in the early and small-scale experiments, but it can hardly be regarded as an engineering method adapted to continuous or rough use.

The latter is the one which in the trials now to be described we have adopted.

The power is generated by a two-horse oil-engine driving a small dynamo in an outhouse of the farm. Thence the current is taken by ordinary overhead wires to the field, where they enter a suitable weather-tight hut, which contains the transforming and rectifying apparatus. The only moving part here is the "break," and if the original dynamo had been an alternator, even this might be dispensed with. The transformer is a large induction-coil, specially made to stand continuous use, and its current is then rectified by means of vacuum-valves in accordance with a patented device of my own.

The negative electricity is conveyed direct to earth, except when retardation is desired, or during drought; while high-tension electricity, all of positive sign, is led by a specially insulated conductor out of the shed to the nearest post of the overhead insulated wires, which are thereby maintained at continuous high positive potential.

The Results and Further Details.

The following is a very brief summary of returns and information supplied to me by Mr. Newman and Mr. Bomford, showing the results from the electrified as compared with the control unelectrified plots:—

summarized results of the 1906 experiments.

Bushels of Wheat per Acre.

(Estimated corresponding increase in straw not measured.)

	From the Electrified Plot.	From the Unelectrified Plot.	Increase.
Canadian (Red Fife) ..	35½	25½	40 per cent.
English (White Queen) ..	40	31	30 ,,

Moreover, the electrified wheat sold at prices some 7½ per cent. higher, several millers in baking-tests finding that it produced a better baking-flour.

The increase appears to be mainly due to better stooling. No marked difference was observable in the development of ears.

summarized results of the 1097 experiments on wheat.

Red Fife, Spring-sown.—Bushels per Acre (Head Wheat).

Electrified.	Unelectrified.	Increase.
41·4	32	29 per cent.

Electrified wheat brighter, and a better sample.

Increase again partly due to stooling, but this time there was better filling-out of ears.

These results are for wheat alone, but a good many other crops were tried at the same time, and they appear in the more detailed statement below.

hours plant running.

1906.

16th March to 10th July, inclusive, 621¾ hours on ninety days.
Average electrical pressure corresponded to a ¾ in. spark.
Current shut off after ears in bloom.

1907.

28th March to 27th July, 1,014 hours on 115 days.
Average pressure corresponded to a ½ in. spark.
Current kept on till harvest.

Further Information, partly from Mr. Newman.

In 1906, owing to the late delivery of some of the apparatus, the work had to be carried on with a somewhat improvised generating-station at the commencement on 16th March. By the end of May, however, the installation was com-

pleted, and worked fairly continuously during the rest of the season, the current being supplied intermittently until 10th July, by which date the wheat had been in ear about a fortnight.

The complete arrangements for generation of the high-tension currents are as follows :—

Direct current, about 3 amperes, at 220 volts, is generated by a dynamo driven by an oil-engine of about 2-h.p. The current passes from the dynamo through the primary of a large induction-coil, with a make-and-break contact interposed in the circuit. From the secondary of the coil the high-tension current passes through the rectifiers, and then by one pole to the system of overhead wires, the other pole being earthed.

The overhead system of wires covered about 19½ acres of ground. The wires were mounted on insulators placed upon larch poles, some 15 ft. high, which were placed in rows, the rows being separated by a distance of 102 yards, and the poles in a row being 71 yards apart. Stout telegraph-wire carried the current down each row, while thin galvanized-iron wires, placed some 12 yards apart, were stretched between the rows, and acted as the discharge-wires. In this way twenty-two poles were sufficient to support the wire over the 19 acres.

Roughly, only one pole per acre is required ; so the inconvenience is practically nil.

The height at which the wires are taken allows a loaded wagon to go beneath.

Owing to the flexible suspension, risk of breakage to the wires is very small. (During the two years the wires have been up at Bevington, apart from a few wires broken at harvest-time by catching in top of extra high wagon-load, only one wire has fallen.)

The acreage was spread over two different fields : in one field some 11 acres of wheat were under treatment, in the other 6½ acres of barley, and a half-acre plot planted with potatoes, mangels, &c.

The wheat-field was of 18½ acres extent, the remaining 7 acres were sown with English (White Queen) wheat, 1½ acres, and Canadian (Red Fife) on 5½ acres. In the electrified part Canadian wheat occupied 2½ acres, English wheat 9 acres.

The results on the barley-field, including the small plot, had to be neglected owing to the great local variations produced by the very irregular manuring the field had previously undergone. The wheat-field, however, as far as one could judge, had been very uniformly treated previously.

In the wheat difference was noticeable at an early stage, the young blades on the electrified part being, in the opinion of many observers, of a darker green.

The crop was judged as considerably heavier by several practical observers, and the straw was, on an average, from 4 in. to 8 in. higher. Both experimental and control plots came into ear at about the same time, but the Canadian wheat under treatment was ready for cutting some three or four days before the control area.

The crops were gathered separately from the electrified and unelectrified plots, and the resultant yields were as follows :—

BUSHELS PER ACRE.

(Estimated corresponding increase in straw not measured.)

	Electrified.	Unelectrified.	Increase.
Canadian (Red Fife) ..	35½	25½	39 per cent.
English (White Queen) ..	40	31	29 ,,

Moreover, the electrified wheat sold at prices some 7½ per cent. higher, several millers in baking-tests finding that it produced a better baking-flour.

No theoretical conclusions can be drawn from this fact, owing to the uncertainty existing as to what factors determine the strength of wheat, but it is interesting to note that greater strength is usually accompanied by increase in percentage of total nitrogen.

Mr. J. Kirkland, of the National School of Bakery, Borough Polytechnic, found the evidence from baking-tests supported by the average of dry glutens from all his tests thus :—

In the electrified	11·15 per cent.
In the unelectrified	10·35 ,,

The somewhat poor yield of wheat obtained from the unelectrified portion of the field is probably explained by a deficiency in lime, which has now been rectified. Further, the wheat was spring-sown, and Red Fife under this condi-

tion does not usually yield good crops. The experiments are being repeated upon wheat during the present season, and strawberries are also under treatment once more.

In 1907, wheat was grown again in the 1906 wheat-field. Current cut off from most of the barley-field, which was down to clover and rye-grass. 8¼ acres in an adjoining field planted with strawberries (Stirling Castle) in March, approximately 2¾ acres having a wire network erected over them. Mangels were planted between the strawberry rows.

The wheat-field was during the early spring given a dressing of lime, 10 cwt. to acre, 4 cwt. to acre bonemeal drilled in, the unelectrified part given 1½ cwt. sulphate of ammonia, and the electrified part ¾ cwt. Barley had been grown on the strawberry-field in 1906, and this was given 10 tons to the acre of farmyard manure, which was ploughed in.

Result of Crops, 1907.

Wheat.—Variety, Red Fife, Spring-sown.

7½ acres unelectrified gave 239 bushels 38 lb. head wheat, 15 bushels 1 lb. tail.
11 acres electrified gave 455 bushels 50 lb. head wheat, 17 bushels 27 lb. tail.
Or, summarizing as before—

Bushels per Acre (Head Wheat).

Electrified.	Unelectrified.	Increase.
41·4	32	29 per cent.

Electrified wheat brighter and a better sample. Increase due to better stooling and also better filling-out of the ears.

Strawberries.

During the first year, the crop was necessarily very small, and was picked chiefly to see if any increase had been obtained. The result showed a 35-per-cent. increase. Earlier ripening was also observed.

Analysis of Samples of the Fruit taken from Bulk.

Mangels.—It was found impossible to weigh either the whole or a part of this crop. Estimated increase (from number of cartloads removed), 25 per cent. Analysis showed an increase in the sugar where electrified, but the results varied considerably.

Small plots of raspberry-canes showed a marked improvement in growth.

Small plots of tomatoes also showed large increase in the crop.

(A curious point about the raspberries was that the foliage and fruit on the old canes showed no difference, but that the new growth, particularly after the old wood was cut back, showed an enormous difference in favour of the electrified. Manurial treatment exactly similar.)

Those interested in the experiments are much indebted to the enthusiastic co-operation of Mr. Bomford, of Bevington Hall, Salford Priors, near Evesham. It may be interesting to note that it was at a farm belonging to Mr. Bomford's father that the first steam ploughing in England was done.

On the History of the Subject.

Professor Lemström published his results, with full details and illustrations both of the apparatus used and of the appearance of some of the resulting crops, in a small book called "Electricity in Agriculture and Horticulture," published in English by the Electrician Company in 1904, and it is well worth referring to.

Professor Lemström is undoubtedly the pioneer in this sort of work; though circumstances connected with the natural electrification of the atmosphere, and with the discharge of electricity from various surfaces, have been pertinaciously examined by Professors Elster and Geitel.

He quotes earlier attempts—one as far back as the year 1746—and describes his own early experiments in the University of Helsingfors, conducted in cardboard compartments in front of a south window, in May and June, 1885.

His only mode of electrification, however, was the old influence machine based on the type of Holtz and Wimshurst, though, on account of their inconveniences during prolonged use, he devised a cylindrical type, which he found on the whole more trustworthy; and with it he obtained striking success—for instance, 37 per cent. increase in the yield of strawberries.

No doubt most of the difficulties connected with experiments in this subject have been due to the difficulty of supplying the electricity in a continuous and convenient manner. The use of the rectifying valves was expected to get over all these difficulties, but the necessary experience cannot be obtained without large-scale continuous running for a good many hours each day.

In 1907 a paper was read by Mr. J. H. Priestley, B.Sc., before the Bristol Naturalists' Society, and is published in their Proceedings, Fourth Series, Vol. i, Part III, 1907, and from this paper the following account is taken:—

One of the earliest modes of supplying electricity to plants, &c., was that of the Abbé Berthelon in 1783. He raised a head of metallic points in the air, in the manner of a lightning-conductor, and made it terminate in a series of discharge-points just over the plants. He states that the use of this apparatus was invariably accompanied by an improvement in the appearance of the vegetation and by an increase in the fertility of the plants.

An opposite or control experiment was made by Grandeau in 1879, when he protected a plant from atmospheric electricity by means of a wire cage, and showed that its development was greatly retarded.

Other experimenters have done the same thing and made careful measurements of the results, which are all in the same direction.

A summary of other workers in these directions, as well as of the less satisfactory methods of supplying electricity in the soil, is also contained in Mr. Priestley's paper.

The work of Professor Berthelot in France, at the Station for Agricultural Chemistry established at Meudon, must be specially noted. He tried the effect of a silent discharge, and particularly of atmospheric electricity, upon plants. He compared the growth at the top of a 28 metre tower with that of plants growing at the foot, and considered that greater growth at the higher level was largely due to the potential gradient in the atmosphere.

Berthelot considers that the clue to advantage of the electric discharge is to be found in an entrance of atmospheric nitrogen into the plant metabolism, but suggests that this is due not only to the formation of oxide of nitrogen, but also to the combination of gaseous nitrogen with carbohydrates within the plant.

Dr. Cook, of Bristol, likewise obtained an increase in the rate of growth by the use of an overhead discharge on a small scale.

Experiments at Bitton in 1904.

During the winter of 1904 Mr. J. E. Newman installed a small trial apparatus, consisting of a small influence machine of the Wimshurst type and overhead discharge wires, at the Golden Valley Nurseries at Bitton, near Bristol. The wires ran about 16 in. above the tops of the plants, or above the rows of tomatoes in the glasshouses, and short pieces of fine wire, with the free ends pointing downwards, acted as discharge-points.

From 7th March to 26th July the machine was running during 108 days for a period of 9·3 hours daily, principally at night.

In all cases control plots were provided, which, as far as practicable, were under identical conditions.

The crops from the electrified and control plots were gathered and estimated separately, usually by weighing. The result was as follows:—

Cucumbers, 17 per cent. increase.
Strawberries (five-year plants), 36 per cent. increase.
Strawberries (one-year plants), 80 per cent. increase, and more runners produced.
Broad beans, 15 per cent. decrease, but ready for picking five days earlier.
Cabbages (spring), ready for picking ten days earlier.
Celery, 2 per cent. increase.
Tomatoes, no difference.

A somewhat similar installation was also working in Mr. G. R. Newman's vegetable-garden near Gloucester. Here a somewhat higher voltage was given by the influence machine, and the discharging-points were kept 5 ft. above the ground. In this case—

Beet showed 33 per cent. increase.
Carrots showed 50 per cent. increase.

The amount of sugar in the beets was determined as follows:—

The electrified yielded 8·8 per cent. total sugar.
The unelectrified yielded 7·7 per cent. total sugar.

The results of some small trials with wheat, also made at Gloucester, were very favourable, so Mr. Newman decided to try the effect of the overhead-discharge system on wheat and barley on a larger scale.

Thanks to the interest taken in the work by Mr. R. Bomford, of Bevington Hall, near Evesham, Mr. Newman was enabled to use some 40 acres of this estate for experimental work in 1906, and experiments commenced on this ground in the spring of that year, and are still being continued.

Some 20 acres of this ground were beneath the discharge-field, and, as it was necessary for practical purposes to have the discharge-wires at a considerable height, the very high-tension current required was obtained by means of an induction-coil and valve-rectifiers upon the system devised and patented by Sir Oliver Lodge, who very kindly lent the necessary apparatus.

It was very largely owing to the generosity of Sir Oliver Lodge and the advice and help of Mr. Lionel Lodge that Mr. Newman was able successfully to complete the necessary installation and to carry out the experiments.

Since this date Mr. G. R. Newman has established a large installation at his nurseries at Bitton, near Bristol.

Inquiries may be addressed to Mr. J. E. Newman, general manager of the Agricultural Electric Discharge Company, at 85 Park End Road, Gloucester.

EXPERIMENT IN FEEDING DAIRY COWS.

In an experiment conducted in France to determine the comparative effect of moist and dry food on the quantity, fat-content, and bacteria of the milk, it was found that the performance of the different groups of cows did not differ sensibly from each other in milk-yield and fat-content during the whole experiment. In the bacterial content no striking difference was observed in the milk of the three groups. It seemed, however, that the moist feeds were somewhat more favourable to the development of the milk flora than the dry feeds. It was concluded that with the exception of a slightly higher milk-yield from the groups fed on whole mangels, as against sliced, feeding wet or dry had no influence in the quantity of the milk and on its fat or bacterial content. The daily ration, which was the same for all the animals, consisted of 99 lb. of mangels, 6·6 lb. of chaff, 11 lb. of lucerne hay, 3·3 lb. of maize gluten, 3·3 lb. earthnut cake, and 3·3 lb. wheat bran.—*Bulletin of the International Institute of Agriculture.*

THE IMPERIAL JAPANESE TOHOKU UNIVERSITY AT SAPPORO (ISLAND OF YESSO).

(Max Muller, in *Deutsche Landwirtschaftliche Presse*, abridged by the International Institute of Agriculture.)

The Agricultural College at Sapporo, which was founded in 1876, was declared on the 1st September, 1907, to be a branch of the Sendai University. It comprises four separate three-year courses for agriculture, agricultural chemistry, forestry, and animal husbandry. Schools of fishery, civil engineering, practical agriculture, and practical forestry are attached to the institution, as well as a so-called preparatory school, in which students are prepared by a three-years course of studies for the University. It possesses two university farms, 185 and 272 acres in extent, of which one is devoted to the experiments and practical work of the students, and the other is a model farm. Besides the above, the institution has also a botanical garden of about 27 acres in extent and can avail itself of 127,244 acres of forest.

In the University itself there are twenty-three professors and twenty-five assistant professors, and in the schools attached to it about fifty lecturers. The total number of students last year was 898—namely, 211 at the University, 297 at the preparatory school, and 390 at the other schools. As University students, only the young men possessing the leaving certificate of the preparatory schools are admitted. For admittance to the preparatory and other schools the leaving certificate of a five-years medium school is required.

WORK FOR THE COMING MONTH.

NEW ZEALAND is a country of wide variation in climatic and soil conditions. In applying suggested procedure it is, therefore, necessary for the farmer to amend it to suit local weather-conditions and the requirements of his soil—information which can best be ascertained by a study of these problems on the part of the farmer himself. Nothing can take the place of local knowledge. Little advice on an agricultural subject is capable of general application in its entirety.

THE FARM.

PRIMROSE MCCONNELL.

JUNE is perhaps one of the most critical months of the year for stock (sheep and cattle) in low condition, or for those of a naturally delicate constitution.

Hoggets and calves affected with internal parasites, and which up to the present have shown no sign of infection, will now be put to the test by the sudden changes of weather that obtain at this time of the year, and their ability to resist attack or otherwise will be determined by the manner in which they are treated. Dry feed and clean well-drained pasture are the best remedies procurable, but they are better applied as a preventive than as a cure. The prices now obtaining for cattle and sheep warrant a more liberal use of hay and oat chaff as an adjunct to winter pasture and roots, and for valuable calves wintered in exposed, cold localities, night shelters in the form of open sheds are very desirable, and their value will be more obvious as farming in New Zealand becomes intensified.

When feeding off roots the areas should be comparatively small, and the stock moved off in wet weather. Feeding roots on the land in very wet weather is not only bad for the stock, but it is also exceedingly harmful to heavy soil, as it spoils its mechanical condition, and a fine tilth for the coming crop is impossible.

Mangels and carrots should be secured in Λ shaped clamps without delay. It is a wasteful plan to clamp the mangels with the tops on—the latter are excellent as manure, and should always be ploughed under. The mangel at best is an exhausting crop, and it is more so when the tops as well as the roots are carted off.

The tops may be quickly cut off by means of a sharp hoe, and an active man or boy will easily top 2 acres a day. Except in the case of Long Red there is no occasion for harrowing out the roots, as they may be tossed into the cart direct from the rows. This plan does away with the more or less injury caused by the harrows. The clamps may be covered over with any rubbish available—even hedge-trimmings. Where there is danger from keen frosts a covering of soil should also be applied, the thickness of which should decrease from the bottom upwards, the top being left uncovered to ensure good ventilation. The mangels should remain in the clamps a month before being fed to stock, in order that their composition may undergo a necessary chemical change.

In the North Island June is possibly the best month in the year for oat-sowing.

Particulars are to hand of some interesting and seeming conclusive experiments that have been carried out in each of the past four years by the Ontario Agricultural College. The object was to determine what quantity of seed per acre gives the best results, not only in the matter of yield but also in rust-resistance, weight per bushel, time of maturing, &c. Perhaps the most noteworthy result is that which refers to stooling, as it seems to be pretty well proved that it is not desirable to encourage this property when the grain is the object in view.

The following table shows the results :—

Inches between Plants.	Seed per Acre.		Heads per Plant.	Per Cent. of Heads per Acre.	Height in Inches.	Per Cent. lodged.	Per Cent. Rust.	Days to Mature.	Pounds per Bushel.	Yield per Acre.	
	lb.	Bushels.								Straw, Tons.	Grain, Bushels.
1	414·4	12·34	1·0	100	20·4	5·6	11·8	91	25·0	1·75	30·60
2	104·0	3·06	1·1	31	27·8	11·9	15·0	93	31·4	1·58	34·95
3	46·1	1·36	1·3	17	32·6	12·9	17·8	94	33·2	1·52	41·73
4	26·0	0·76	2·0	13	33·1	29·9	20·9	95	31·5	1·29	38·99
6	11·6	0·34	4·2	12	35·3	35·8	25·4	97	28·6	1·40	37·42
8	6·5	0·19	6·5	11	34·9	34·7	27·7	99	26·4	1·20	31·77
12	2·9	0·09	11·2	9	34·9	30·1	33·2	100	23·9	1·03	21·93

The fact that thin seeding and stooling properties are conducive to rust has already been demonstrated at this farm. The conclusions arrived at, however, do not warrant any change in the quantity of seed per acre recommended in last month's article.

Land on which a catch crop was fed off in May, and which is intended for roots or rape in the coming season, should be ploughed without delay, and as deeply as the nature of the soil will admit. Catch crops which have been grown for green-manuring should also

be ploughed under, and for this purpose nothing is so effective as the swamp plough, with a heavy chain attached to the beam to drag under all fag-ends. For ploughing weedy soil this plough is excellent, and with a furrow about 14 in. wide by 7 in. deep the majority of the weeds will be smothered to such an extent that they will never recover.

It is a good time to top-dress and harrow pastures.

Lime should not be applied at the same time as the fertilizer, but some time previously—particularly the burnt lime. For heavy or peaty soil nothing excels basic slag, and on medium soils basic superphosphate gives splendid results; also a mixture of slag and superphosphate, which should be applied as soon as mixed. When necessary to apply potash to pastures, muriate is the best form. As a rule, clayey soils contain abundance of this ingredient, while it is generally deficient in sandy soils.

All harvesting implements should be thoroughly overhauled, repaired, and, if necessary, painted, during the winter months.

Young horses' hooves should be seen to, as the wet weather and soft ground encourages abnormal growth. The hooves should be reduced by rasping the sole, the frogs being left severely alone.

THE ORCHARD.

W. A. Boucher.

The month of June is a busy one as far as orchard work generally is concerned. Consignments of trees will be coming to hand to be planted out in the orchard rows when soil and climatic conditions prove suitable. Of late years many nurserymen have adopted satisfactory measures for the control of the pests and diseases attacking fruit and other trees, and are thus in a position to deliver their nursery stock as far as posible in a clean and healthy condition, thus saving the purchaser any further trouble in this respect either before or after the planting-out in the orchard. But should the necessary treatment not have been effected before the delivery of the trees, then it will devolve upon the purchaser to take such precautions as will be effective both for the control of insect-pests and fungus diseases. For the control of insect-pests it is generally recognized that red oil emulsified and diluted gives excellent results,

and for fungus diseases the Bordeaux mixture. To leave the treatment of nursery stock until after the trees have been planted involves much unnecessary expense and labour. A thoroughly satisfactory method is to prepare the necessary mixtures in a cask or some other suitable vessel, and, holding the nursery trees in small bundles with the roots upwards, dip in such a manner that every portion will be well covered except those parts which have been below ground before being lifted from the nursery rows.

For almost all classes of deciduous fruit-trees it is desirable that the Bordeaux mixture should be used in the autumn or early winter, to be followed, while the trees are still quite dormant, by the application of the red oil emulsified and diluted. The Bordeaux mixture of winter strength is recommended—*i.e.*, 10 lb. sulphate of copper, 10 lb. fresh roche lime, 40 gal. of water; the red oil in the proportion of 1 part of oil to 12 parts of water. The reason for this method of disinfecting nursery stock will no doubt be obvious, for large numbers of trees can be treated effectively and economically in a short time without any waste of the compounds recommended; but if disinfection be deferred until after the trees have been planted out in the orchard, the process of spraying each individual tree will occupy much time and also involve considerable waste of the spraying compounds used.

Red Oil for spraying Fruit-trees.

From the results, or, rather, the absence of satisfactory results, following upon the dipping of nursery stock and the spraying of matured trees in the orchard one must conclude that some of those who have used red oil for the control of such pests as mussel scale and red spider have purchased a cheap and inferior article. Reference has been made before in the pages of the *Journal* to the necessity of selecting for spraying purposes compounds that have been well tried and well proved. Otherwise financial loss must result to the grower, for, whether his crop be destined for the local or for the oversea markets, the question of freedom from infection by the above-mentioned pests must certainly arise.

Spraying Peaches and Nectarines.

Even now there are growers in some districts who do not realize the importance of keeping peach and nectarine trees protected as far as possible from the attack of fungus diseases. It has been proved repeatedly that only by careful and thorough spraying with the Bordeaux mixture can these popular fruits be maintained in health and vigour. Growers are recommended to spray as soon as

possible after the leaves have fallen with the Bordeaux mixture, winter strength, and to repeat the application when the buds have commenced to swell.

MUSSEL SCALE, RED SPIDER, AND MEALY BUG.

It has been noticed that in districts previously comparatively free mussel scale and red spider have been steadily on the increase. In view of the export trade to oversea markets, which is available for clean sound fruit, especially apples, it would seem desirable that all apple orchards should be sprayed with the red oil emulsified and diluted, in order to check infection already existing and prevent any further spread of such infection.

CHERRY-LEAF SCORCH.

Since growers have adopted the regular use of the Bordeaux mixture for the spraying of cherry-trees this disease has been much less in evidence. The first application should be made as soon as possible after the leaves have fallen.

THE LEMON ORCHARD.

Attention may again be drawn to the fact that the brown-rot of the lemon is a fungus which thrives and increases during the cold wet weather of winter and early spring. Unless precautions against infection are taken it is quite possible for a crop or a large percentage of the fruit to be ruined within a short space of time. The treatment recommended is to apply as a soil-dressing round about the trees from 2 lb. to 4 lb. of sulphate of iron per tree, according to the size and age of the trees, and also to spray the trees with the Bordeaux mixture, summer formula.

THE VINEHOUSE.

S. F. ANDERSON.

As we are now well into winter—the dormant period of deciduous plants, including that of the vine—work that can be done only at this time should be pushed forward, especially where the houses are large and the hands to do the work are few.

The most important of these works are—

Pruning the vines and, where required, rearranging the rods at the best distances on the supporting wires.

Cleaning and applying to the rods after pruning such remedies for the suppression of insect and fungoid pests as suggested from time to time in the *Journal* and in Bulletin No. 40.

Repairs to, or fixing, the wires for supporting the vines. A good method of doing this is given in the July number of this *Journal* for 1913.

Fixing wire netting over ventilators and providing extra doors of light frame covered with netting to keep out birds. These latter are very necessary when the grapes are hanging ripe. The cost of doing this may save many times the damage that can be done by one or two blackbirds.

Thorough cleaning the inside of the house after pruning and treating the vine-rods. Where hot water can be used for this it is the best for destroying eggs of insects. This can be followed by such whitewashing and painting as may be decided on.

See that drains are doing their work. Make others that may be required.

Manuring and forking over the borders inside and out the house. In connection with this, the old earth vine-houses in some cases may require more or less renovation by replacing unsuitable soil with good peaty earth or well-rotted sods.

Repairs of any kind, replacing of broken or slipped-down panes. It is waste of time and glass just to tack loose panes in their place; they should be bedded in putty.

THE POULTRY-YARD.

F. C. Brown.

There should be no culls in the yards in June. Every hen should either be laying or be due to lay within the next two months. The diet should therefore be liberal and of a forcing character. Everything, in fact, should be done to encourage egg-production. All pullets should be laying by now, while the attention the second-season bird now receives will largely influence the time at which she will again come to profit.

Good feeding is imperative at this period of artificial production, but feeding is not everything. The birds should be comfortable, so that only a minimum amount of the food supplied will be required for the maintenance of the bird. Every assistance should be given her in order that she may attain her maximum production.

An abundant supply of grit, a plentiful supply of fresh water, a daily ration of green food, and good dust baths are of great importance. Also keep the nests clean, and periodically renew the nesting-material. Everything, in short, should be done to prevent any check to production. It is attention to the details that makes poultry-keeping pay; not doing one thing well and neglecting the others. Especially is it imperative to have everything just right when hens are laying out of their natural season.

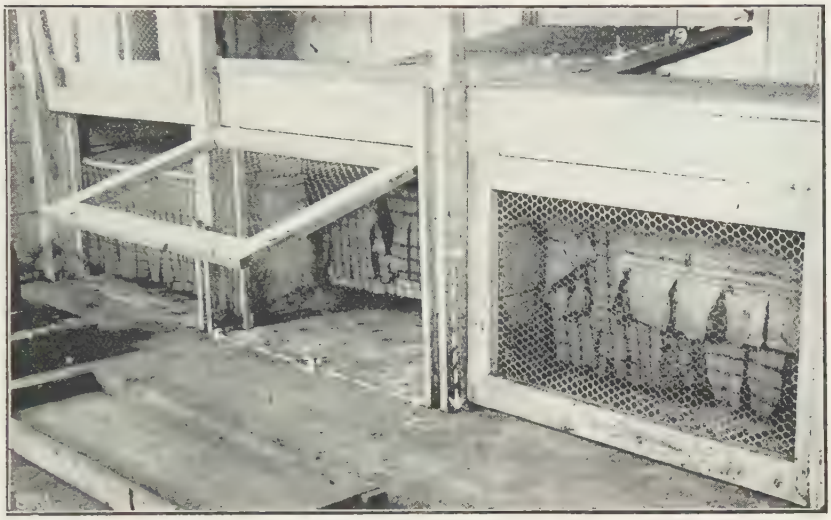
Disease.

It is foolish to expect fowls to be profitable when they are not maintained in the very best of health. Time and again the advice has been given in these pages that constitution should be the first consideration. If the birds have not strong constitutions they cannot be expected to lay to their maximum capacity, and, what is equally important, ward off those infectious diseases which are a menace to the industry. The best way to fight disease is to prevent it. True, infectious disease sometimes appears in the best-managed plants, but there is inevitably a cause, either through birds introduced or some little defect not observable to the eye; indeed, at times it is impossible for the keenest of poultrymen to locate the origin. This emphasizes the necessity of taking every means of preventing disease becoming established. At this time of the year in particular the closest watch should be kept on the birds, and if the slightest symptom of cold makes its appearance—perhaps through the medium of a weakly bird from stock having a predisposition to a particular trouble, or by the bird roosting against a bad crack—the affected fowl should be promptly isolated. No moment should be lost. Every bird should be critically examined. Isolation is the only safe treatment. Once a trouble has gained a foothold it is almost a hopeless matter to attempt to check it, or if it is stopped very serious loss will have taken place. I have in my mind's eye large plants where the outbreak of serious disease may be anticipated at any moment. Intensive poultry farming is a successful enterprise in this country, but the more intensive the system the greater the need for the maintenance of the most exacting conditions. Keeping the houses absolutely draught-proof and in the most sanitary condition is not enough if the yards are allowed to become stale and a breeding-ground for disease. A thoroughly clean run is just as important as a thoroughly clean house; indeed, everything should be clean about poultry—the drinking-vessels, feeding-troughs, &c. April, May, and June are the three worst months of the year for disease infection, especially

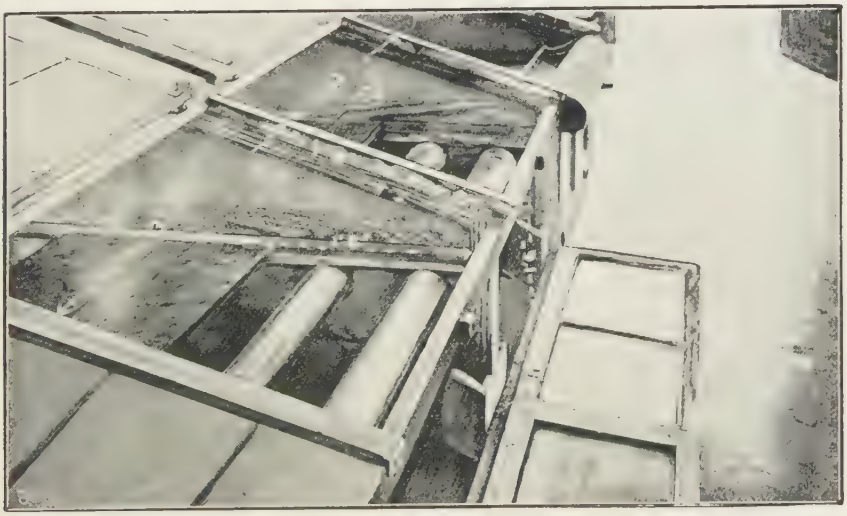
diseases which have their origin in colds; and it is at this time when some birds, through want of proper management, are most prone to contract an infectious trouble. There are the second-year birds which are in a moult after an exhausting laying season and have not been given a chance to fully recover their strength by means of judicious feeding and care; and then, again, the late-hatched birds, which have seldom the desired stamina. A bad system of management will rapidly discover a weakly constitutioned bird and encourage the passing-on of the trouble to other members of the flock. In all but one or two isolated cases the disastrous trouble of diphtheritic roup—which is far too common this season—could be seen at once to be due to poor management; disease being practically invited. It is either bad quarters and foul runs or a poor diet. I have been called in to advise on bad cases of infectious diseases where the conditions were so bad that the wonder was disease had not wiped out the flock long before. In some of these the trouble was due to the attempt to build up a large flock before the owner had provided proper accommodation and before he knew how to handle fowls on a commercial scale. These weaknesses were accentuated by his mistaken belief that it is possible to overfeed the high-type layer. I cannot emphasize too strongly the necessity of having the houses absolutely draught-proof, the use of alternate runs so that the birds may occasionally have a change to fresh grass, and the continual war against vermin. Cleanliness in all things is essential; it is invariably the hall-mark of the successful poultryman. Dirty and draughty houses, stale runs, and low feeding are an invitation to disease.

A Brooder-house.

As many inquiries have been received for some plan of the brooder of the poultry plant of the Ruakura Farm of Instruction, referred to by Mr. C. Cussin in his paper on "Chicken-rearing" at the recent Poultry Conference, reproductions of two photographs of the main plants of the Ruakura brooder are herewith published. The pictures explain themselves. It will be noticed that the pipes from and to the Ideal stove are of a large size—3 in. in diameter—and that the first one is only 3 in. from the back wall of the brooder-box, there being 4 in. between the two pipes. The object of the pipes being set so far back is to discourage the chickens gathering in the back portion of the brooder-box, when, if the heat becomes too great for them (as it too often does), they crowd in the corners, and in their endeavour to escape from the heat they huddle and sweat, with the result that on coming into contact with the outside atmosphere in the morning they become chilled—a



Front View.



C. E. Cuming, photos.]

Back View.

The Ruakura Brooder.

condition which is the forerunner of white diarrhœa and other chicken troubles, too often disastrous in their consequences. With the pipes well back the chickens are encouraged, in moving away from the heat, to nestle in the space in front of the pipes, where they have ample space in which to enjoy in comfort the temperature that nature demands. Under these circumstances a high degree of heat can always be maintained; this is indeed desirable, as, with the chickens having ample space at the right degree of heat in front of the pipes, they can retire to a warmer position under the pipes should the night be particularly cold, as when a sudden cold snap is experienced. The huddling of chickens in hot corners from which they have not the sense to escape is the cause of more than half the mortality in artificial brooding, and, with the pipes situated right at the back of the brooder, this great source of danger in brooding is eliminated. At the back corners of the brooder-box provision is made for ventilation, by having holes bored to the outside at each corner near the bottom and under the glass frame. The draught is kept from the chickens by placing a piece of wood 6 in. deep across the corner, with wire gauze or perforated zinc at the top of this. With the open front there is thus a current of air always flowing well above the chicks through the brooder-box. The hover, it will be seen, is movable, sliding, as it does, on battens fastened at either side of the box. The back of the box is constructed of hinged glass frames, to have the chickens when they are in the brooder-box under observation without the necessity of lifting the lid. A curtain is provided, so that when the chickens are first placed in the brooder they may rest in as undisturbed a state as possible. When the wire-netted fronts are fastened up they serve as a means of preventing the older chickens from flying out of the runs.

A brooder-house installed with a pipe system of heating should be at least 16 ft. to 18 ft. in depth, it should be from 40 ft. to 50 ft. in length, the height at the back should be 6 ft. 6 in. and in front 8 ft. 6 in. The passage-way should be about 3 ft. wide.

THINGS TO REMEMBER.

Cleanliness is one of the most important requirements in poultry-keeping.

Colds are the forerunners of roup.

Prevention is better than cure.

If colds are to be avoided the birds must be made comfortable without being coddled.

Feeding the winter layer in the run in wet weather is inviting trouble.

No fowl-house is complete without ample scratching-accommodation.

To resist disease, birds must be kept in good condition. Ample food is imperative.

Half-starved fowls are never profitable and are generally the first to take disease.

Better to cull the drones than stint the profitmakers in the matter of food.

If birds are found to be too fat they are obviously not concerned in egg-production. It is impossible to overfeed the good layer.

The poultry-shows will soon be here. Breed points happily combined with utility characters should be looked for in competing birds.

THE LATE POULTRY CONFERENCE.

The fourth annual poultry conference, held in Wellington last month, was the most successful gathering of utility poultrymen yet held in the Dominion. The addresses and papers were of a high order of merit, while the several discussions which took place indicated that delegates came prepared to take a broad view of the questions under consideration. The educative influence of the conference must be considerable.

THE APIARY.

F. A. Jacobsen.

Beekeeping in New Zealand is developing to considerable proportions. With the information and knowledge now at the command of every individual in the Dominion it is possible for a man or woman with no extensive knowledge of bees and their habits to engage in apiculture in a small way, and eventually to make a commercial success of it. With this available knowledge it would be advantageous in many instances for farmers, fruitgrowers, and others who do not realize the importance of bees as fertilizing agents to keep a few colonies. In instances of this kind the lesser value of the hive bee—the production of honey—would itself compensate in an agreeable manner for the necessary attention bestowed

on the colonies. Honey is a valuable article of food, and there is at all times a considerable demand for it, but the real value of bees to the farmer is their assistance to agriculture. In many instances crops of various kinds would be a failure but for pollination, and in this bees are the chief agents. The presence of a few colonies in an orchard, providing there are no others near, would materially assist in a larger production of fruit. Again, certain varieties of clover would be practically seedless and not worth cutting were it not for the work of these industrious insects. This is often instanced in Canada and the United States of America in reference to alsike clover. Thus it will be understood that a few hives of bees, properly kept, form an almost necessary adjunct to the fruitgrower and farmer; also, few farmers realize the enormous amount of nectar in the blossoms going to waste, which would otherwise be gathered by bees and stored for the farmer's table use.

To Intending Beekeepers.

I am often asked the question, "Could you tell me the best way to commence beekeeping?" In every case it is advisable to start with one or two colonies only, and these would form the nucleus of any further increase desired. Should the beginner intend to eventually keep a commercial apiary, it is most necessary that any appliances bought should be quite up to date. Experienced beekeepers have often lamented the fact that their beginning was made with obsolete hives, and they have had to some extent to continue with their use. Later many of them sacrificed their old hives for the better working of their apiaries.

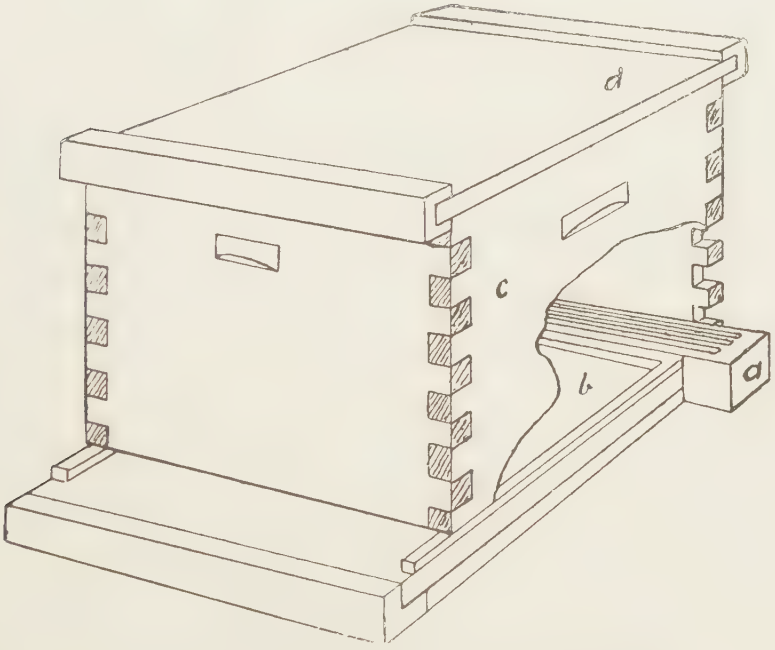
Established hives are usually bought about this time of the year, when they can be shipped to any new location without fear of losing many bees. Swarms, however, may be purchased in the spring from the nearest bee-owner, and transferred to their new home by any means that suggests itself. The hive should be filled with ten self-spacing frames. Each frame should contain a full sheet of foundation comb, which, in addition to the usual holder, should be attached to two or three fine wires stretched horizontally across the centre of the frame.

Another course for the beginner to adopt is to buy nuclei or colonies of bees on three or four frames. About the month of November, according to the season, each of these may be transferred to a large hive containing a full complement of frames with foundation comb, and they will build up to large colonies. Each of the nuclei should contain a queen, at least two drawn combs, and a quantity of sealed honey.

THE OUTFIT.

The beginner would require to purchase from the agents: Three dovetailed hives in the flat (complete); three feeders (Alexander or division-board); one smoker; one bee-veil; one reel tinned wire (½ lb.); one comb-foundation embedder; 4½ lb. medium brood comb-foundation; one handbook—"A B C and X Y Z of Bee Culture." The approximate cost would be £2 15s.

With the assistance of the handbook it will be seen how to nail together and paint the hives, how to feed the nuclei, and, in short, how to look after the colonies generally.



a, feeder; *b*, the bottom board; *c*, the super; *d*, the cover.

THE ALEXANDER FEEDER IN POSITION.

RACES OF BEES.

The common hive bee was introduced into New Zealand in 1839, and is known as the Black bee. The majority of bees in this country are of this kind, and when properly cared for exhibit great thrift. They are very subject, however, to foul-brood.

The Italian bees were introduced into the Auckland Province in 1880, and have always exhibited excellent qualities in every respect. This kind is recognized as the best for commercial use.

Carniolian bees have been imported from the higher regions of Austria, and are noted for their gentleness. They are a greyish colour, with strong swarming tendencies, and on this account are not suitable for commercial apiaries.

Caucasian bees are very gentle, and closely resemble the Black race. Like the Carniolians, they swarm readily, but gather an excessive quantity of propolis, which is undesirable.

Besides those already mentioned, there are the Syrians, Cyprians, and Tunisians, but they do not meet with general approval. The Italian and Blacks are considered the best for commercial purposes, especially the former. Crosses between these two races are also good.

The Colony.

The number of bees in a colony vary, but in the middle of the summer a hive should contain a queen, between 30,000 and 40,000 worker bees, and a varying number of drones. The queen keeps up the population of a colony, and sometimes lays as many as 3,000 eggs in a single day. She lives the longest of all the bees, and may be distinguished from the others by her long narrow body. She is produced in a large conical cell, and fed on specially rich food. Several days after her birth she takes her wedding flight, and is fertilized by a drone while on the wing. This is the only flight of its kind during her life. She is now able to lay both male and female eggs.

The workers are undeveloped females. They carry on all the work of the colony, which includes feeding the young, gathering honey and pollen, cleaning the cells, comb-building, ventilating the hive, and defending it upon attack. They are, indeed, very energetic, and practically govern the hive.

The drones are the males of the colony, and they otherwise lead a useless and lazy life. They are fed by the workers until the close of the season, when they are excluded from the hive. Their only duty is to secure the fertilization of the queens at swarming-time.

The Stages of Development.

	Egg.	Larva.	Pupa.	Due to emerge.
Queen	3 days	5½ days	7 days	15½ days.
Drone	3 ,,	6 ,,	15 ,,	24 ,,
Worker	3 ,,	5 ,,	13 ,,	21 ,,

General Attitude.

Beekeepers should study the characteristics of their bees. Some colonies are gentle, and may be easily handled, while others exhibit

undue ferocity. The beginner should not become alarmed on receiving a sting, but should immediately withdraw the sting by a scratch with the finger-nail, and apply a puff or two more smoke over the frames. Rapid or jerky movements should be avoided, and gentleness should be observed wherever possible. The bees, when smoked, gorge themselves with honey, when they offer very little further resistance. When examining hives do not keep them open too long, especially when the weather is cold, as the brood may probably be chilled. If possible, avoid any manipulation on cold or showery days, as the bees at these times have a tendency to be vicious. The best time to examine colonies is on a fine sunny day about noon, as the majority of the bees would then be absent from their hives in search of pollen or nectar.

HONEY.

Honey is not gathered by the bees as is popularly supposed. It is the nectar, which is an exudation of plants made accessible by their blossoms, which is collected. This is a thin sweet fluid which, while in the honey-sac of the bee, undergoes concentration and becomes thicker. Formic acid, secreted internally by the worker, is added, and the fluid is then stored in the cells, where it undergoes a further change before it becomes ripe and the cell is capped. Honey may be of different colours and various flavours. White honey is gathered from white clover, thistles, the rata-tree, peas, &c. Amber honey is obtained from catsear and blue-gums. A darker kind emanates from manuka and various kinds of trees in the bush. The best kind for commercial purposes is that obtained from white clover, &c.

WAX.

Beeswax is of considerable commercial value. When it is understood that it takes more than 10 lb. of honey to make 1 lb. of wax this will be realized. It is secreted underneath the worker's abdomen, and may be seen projecting in scales from the abdominal segments. A high temperature is required for this work. When clean and properly moulded, wax realizes from 1s. 4d. to 1s. 9d. per pound.

POLLEN.

Pollen is of various colours, and is gathered from the blossoms by the bees and carried to the hive in specially constructed pits on the hind legs. When mixed with honey it is commonly known as "bee-bread," and forms their food. It is principally when pollen-gathering that the bees carry out their important work of pollination.

Propolis.

When a hive is opened it is usually found that the mat adheres to the frames. The matter, or glue, is called propolis, and is gathered by the bees in a similar manner to pollen. It is used to block up all crevices likely to cause inconvenience to the colony.

Combs.

The combs of a colony are contained in the frames, and may be lifted out for inspection. There may be three sizes of cells on one comb—namely, worker, drone, and queen. The worker and drone cells are six-sided, the former averaging five to the inch and the latter four to the inch. The queen cells are large conical structures, which project downwards, and are used exclusively for queen-rearing. The other cells are those used for storing honey.

Supposed Injury of Fruit by Bees.

It is generally supposed—and beekeepers have often to combat the idea—that bees puncture sound fruit and afterwards suck the juices. This idea is erroneous, for they never puncture sound fruit; but when no nectar is available they often follow up the birds that have previously damaged the crop. *Ichneumon*, or soldier flies, do this as well.

THE GARDEN.

W. H. Taylor.

Vegetable-culture.

Though practice varies somewhat in different districts, there will not be much planting or sowing anywhere. It is usual to sow peas in May in the northern districts, and also in southern localities which are specially adapted to early work. The question most frequently asked in this connection is, What is the best variety? It is a difficult question to answer—first, because locality and soil have both some effect on varieties, and, second, because there are various opinions as to what constitutes a good pea. For many years I have done what I can to suppress Stratagem. There is no denying the fact that it is a poor thing on the table. It has a skin which is as thick as the hide of a rhinoceros, and which frequently falls off in boiling, so that you have a dish of peas and skins mixed together. This is sure to happen when the peas are

properly cooked. Still, many market growers pin their faith on this variety. It certainly is a good cropper, and the pods are a good size; therefore, if it sells freely—and I suppose it does—it must be good enough to grow. In former numbers of the *Journal* I have said that I do not consider the true dwarfs or first earlies profitable to grow where large quantities are desired. The type referred to is that of American Wonder and Little Gem. These and similar varieties find their right place in a private garden, where a few days earlier is a matter of moment; but the crop they give is very small, and is quickly over. My experience has led me to think the best varieties for early use, where quantity is of more consequence than a week earlier, are Daybreak and Carter's Springtide. Both are excellent in flavour, and are good croppers, continuing for several weeks. They have not, however, very large pods. These varieties are largely grown for canning purposes, which fact is at least a guarantee of cropping-powers. Of the two varieties, I prefer Springtide, as it is shorter-jointed and less leafy, and is therefore gathered with greater celerity. Every one to whom the pea is an important crop should try small quantities of several varieties each year in order to get a first-hand knowledge as to which are best, but should depend for the supply only on an already proved variety.

Cabbages.—In some places these are ready for planting out in May; more generally, however, in June, and in some places even later. There is one thing that should never be forgotten—viz., the plants put out should be those raised from seed sown late in the autumn. It is useless to put out earlier plants, because they would certainly run to seed. The cabbage, like the cauliflower, is a biennial plant, going to seed the second season. Their natural tendency is to throw up flower-stems in spring. The gardener's aim is to get plants as early as possible, yet without having in them sufficient of the influence of the previous season to impel their flowering in spring. The end of March or early in April has been proved to be the safe time. If sown a fortnight earlier all the plants may bolt, and if sown later they do not come on quickly enough to be of service. When the plants have started, every effort should be made to keep them growing without interruption. Plants which lag are quite likely to bolt to seed. The bolting tendency is influenced largely by soil: in light soils they bolt more readily than in moderately heavy soil, while heavy clay soil is worst of all, because in this case roots are very sparingly made owing to the coldness of the clay, and the result is stagnation. In any soil it is necessary to keep the surface open; the influence of this is more beneficial than manure. Where the soil is light, nitrate

of soda may be given with good effect. When thrown down close to the stems of young plants, a teaspoonful per plant is sufficient. The quantity may appear small, but it may easily work out at upwards of 2 cwt. per acre. If the soil is heavy, nitrate of soda should not be given at this time; it tends to make the soil cold.

Lettuces may be planted as soon as the plants are large enough, and it is wise to consider them so as soon as they can be nicely handled. If the beds are raised somewhat the soil will be warmer. It is not a good plan to dig in fat manure at this time—it keeps the soil cold; but if there is at hand some very old stuff give them that. It is useful in several ways. Roots are made very freely in such stuff; it tends to keep the soil open, and by increasing the blackness of the soil it makes it warmer. Dark soil holds heat longer than light-coloured soil. Good beds of lettuces should be put out; they will stand till December, and give the best heads of the season.

Horse-radish.—In many families this root is an indispensable accompaniment to roast beef, yet it is seldom well grown. The usual plan in this country is to let it take care of itself after being planted. The result is tough, scraggy stuff, quite different from and very inferior to the stout, juicy stems obtained by proper culture. Now that the tops have died down it is a good time to take it in hand. The whole of the roots should be trenched out as a preliminary. This being done, sort them out. Cut off lengths of all that are stout enough for use, and heel them in where they may easily be got at when wanted. A dryish place under a fence or hedge, or a heap of sand, will be a good place to store them, but cover them up thoroughly or they will become flabby. Do not place them in bunches, or they may rot; separate them by layers of soil. This plan has a double advantage. It saves much time in winter; a stick can be taken out in a moment, instead of delving in the wet, seeking for a stick in a wild mass of scraggy stuff. The lifted pieces also remain fit for use for a longer time than they would if left in the bed, because of the check and the drier conditions. I have always found that they will keep until newly grown sticks were ready, although it would sometimes be necessary to pull them out and rub off growing shoots. Horse-radish will grow in any soil, but good sticks can be grown only in good soil. Much manure is not wanted, but deeply trenched soil is essential. The sets must be planted deeply, and the roots must go down below the sets. The trenching should be 30 in. deep. There are several ways of planting the sets, and two different kinds of sets. In all cases the new produce should be an entirely new growth, and not a thickening-out of the old sets. One kind of set is a crown with a bunch of roots around it. This kind of set is planted upright, like

an asparagus-plant, the crown being about 12 in. from the surface. The other style of set is a piece of root of medium thickness, cut from any part of a long root, and 5 in. or 6 in. in length. To plant this set, some growers make a hole with a crowbar, and drop the set down at least 12 in. The produce is the stem made above the set. A better plan is to lay the sets in a horizontal position, 12 in. from the surface. An expert workman can put in the sets during the process of trenching. The produce of the sets so placed is the same as in the former case.

Where it is intended to plant new *asparagus* beds it is wise to get the soil prepared a long time ahead, so that it may settle down and the surface become sweetened by exposure to the air. If water hangs in the ground it should be drained. Trench at least 2 ft. deep. Work in a fair quantity of good manure, and also a liberal quantity of wood-ash, with burnt earth, road-sand, thoroughly decayed garden rubbish, or anything that will help to keep heavy soil open, if such be needed. The wood-ash should be used in any case.

No effort should be spared to keep all ground and surroundings clean: rubbish of any kind harbours pests, insect and fungoid. Hedges should be trimmed, and all the woody trimmings should be burnt. Woody matter in decay generates fungoid growths. The ground beneath the hedges should be kept as clean as the open: weeds and dead leaves make good hiding-places for snails and woodlice, and are often the only hiding-places in otherwise well-kept gardens. Old cabbage-leaves and such refuse should be burnt. If showing black spots or blotches, they are diseased. Perishable rubbish put in a heap to rot should occasionally be sprinkled with lime. The lime is said to prevent the development of fungoid growths. Cabbage-stumps should be burnt, unless trenching is being carried out, in which case put them right at the bottom, where they will do good. Never dig them in; the hollow stems give shelter to slugs, and wire-worms are usually abundant where cabbage-stumps are decaying in the ground.

An Object-lesson.—The writer is now engaged on the Havelock hills, in Hawke's Bay. Here vegetable-gardening is accompanied with some difficulties. In a general way, French beans and peas are an absolute failure during the summer months. Old residents do not attempt to grow them. My own experience was that both peas and French beans grew well till the really hot weather set in; then they died absolutely, and copious watering failed to save them. Yet climbing beans did well through it all, and are still (16th April) bearing well, though they were never watered. Obviously their deep-rooting habit saved them, the roots being below the hot surface soil.

LAWNS.

Many things in combination are necessary to make a good lawn, which is one of most pleasurable things about a garden, large or small. On the other hand, a bad lawn is a source of annoyance. To know exactly what is required to make a good lawn it is necessary to have a knowledge of local conditions. What may be right in one case may be very far from right in another. It is generally thought that autumn is the best time to sow, but even that is not always the case. The time to sow is when there is the best prospect of the young grass covering the ground in the shortest time. If the grass does not quickly occupy all the surface, weeds will fill the gaps. Even if there were not the weed trouble, there is another nearly as great. If dry weather supervenes before all the surface is covered, it is usually very difficult to get the bare places covered. In low-lying and flat places, where water remains about during winter, greatest success is met with by sowing in spring. Such places being cold in winter, the grass does not progress fast enough if sown in autumn, and weeds get their chance. In such instances my experience has shown that when sown in spring the grass grows at an astonishing rate. I have known of a first-rate sward being obtained in eight weeks from the time of sowing. In such places a mixture of crested dogstail, fine-leaved sheep's fescue, and *Agrostis stolonifera* will make a good lawn. In places likely to be wet in winter *Poa pratensis* should be added. In a general way these grasses will make a good lawn almost everywhere; but if any part of the lawn is shaded by trees or otherwise, sow some *Poa nemoralis* on the shady parts. Where conditions are abnormal —or perhaps I should say different from the generality—these grasses will not be found entirely satisfactory. In Hawke's Bay—I presume it is the same in other hot places—the grass all dies down in summer, and then weeds take possession, so that a clean lawn is almost impossible, at least while the usual grasses are employed. I am quite convinced that the best grass for such places is Indian doob-grass (*Cynodon dactylon*). This grass appears to flourish in dry weather, and it does well in wet weather also. It takes such complete possession of the soil as to leave little room for weeds. It would not be necessary to sow as much seed as is usually done, for, owing to its stoloniferous habit, one plant quickly covers a lot of ground. The seed is too expensive to allow of sowing more than is necessary, and thin sowing creates the difficulty of keeping the ground clean till the grass has covered it. My suggestion is to sow a proportion of Italian rye with the doob. As the rye would not be allowed to seed, it should die out the second

season and leave the doob in full possession. About 100 lb. of seed will sow an acre of lawn. I suggest using one-third doob-grass and two-thirds Italian rye. Before this is in print I hope to have an area sown down in this way. I would advise any one who is repairing lawns in such places to sow doob-grass on bare patches or where the grass is thin. Mossy lawns are very unpleasant, being wet and spongy in winter, and brown in summer, when the moss dies. The cause may be want of drainage or poverty. In the former case the remedy is obvious; in the latter give a dressing of basic slag. In the meantime scratch off as much of the moss as possible. Do this, of course, before applying the manure. The best implement to use is a home-made rake formed of 2 in. wire nails fixed in a 2 in. by 2 in. slab of blue-gum, or a thicker piece of tough rimu as may be convenient. When worms cast on a lawn it shows want of drainage: water lying in the lower strata of soil has driven them up. A good dressing of lime will bring the worms to the surface, when they can be swept off. Drainage is the permanent remedy.

Draining lawns is a work which requires to be done in a very through manner if the best results are expected. It is very little use to put pipes at the bottom of a trench and cover them in with soil. They require to be covered with something that the soakage of water will not close up; and if the soil is only slowly pervious to water, and drainage is necessary for that reason, it must be obvious that it will in time revert to the same condition, although it may admit the water to the pipes for a time. Still, I have seen in quite recent times a large number of pipes laid that carried no water because they were not sufficiently protected. A covering of scrub is sufficient on cultivated land. It is not, however, suitable for lawns, because it is settling down for a long time, thus disturbing the level of the lawn. Where large works, such as iron-foundries, are within reach the clinker refuse from their furnaces is the best possible material. Put it through a screen, cover the pipes with the clinkers, and finish with a layer of ashes riddled out. The ashes will keep the soil out of the clinkers, and the soil will never mix with the ashes. Leave room for a foot of soil over the ashes, or the line of drain will be observable by a strip of brown grass in summer, owing to dryness of the soil. Such a drain acts perfectly and for all time, and there is no sinkage of soil.

Weeding a lawn is a matter that should be taken in hand seriously if it is desired to make a good job of it. When a lawn is very weedy there is often the thought that it will be easier to dig it up and sow afresh than it will be to weed it. It is seldom that

this is right, for it is no easy matter to dig up an old lawn: the turf is tough, and constant treading and rolling has made the surface close; it is sometimes a long job to get a good surface after it is dug up. On the other hand, an important consideration is that the work of weeding will do the lawn a lot of good, for loosening the surface will admit air and sweeten the soil; and if it is top-dressed after with fresh soil or compost much of it will work down among the roots, and do good in that way. There is more than one way of weeding a lawn. Daisies are the most troublesome weeds to eradicate, and sometimes render it necessary to lift all the turf—a somewhat heroic measure, made easier by knowing the proper tools to use. The most important point is to cut all the turves the same size and thickness. The most difficult part of the work, and the most tedious unless the proper tool is used, is cutting the turves to the proper size before lifting. The tool to use is variously called a "race" and a "retter." With this implement the work is quickly and easily performed. The turves being marked out, cut a line of turves across one end of the lawn and lay them aside; then begin at one end, cut a turf and push it forward to the place where another was taken from; now put one hand under the turf and push out the weeds —it will be quite easy, provided the turf is not too thick; then leave the turf where it is to remain. Thus proceed right over the lawn, so that when the end is reached it will only remain to wheel the first lot lifted to the place the last came from. There is an implement, called a daisy-rake, designed to extract daisies from lawns, but it is of very little use. It takes out a good many large ones, and leaves all the small ones, which soon become large. Digging up lawns of this kind is doubtful policy, because the soil is sure to be full of seed. It is effectual if the soil is good enough to admit of trenching the top down, but it would cost more than weeding. The other practicable way of weeding is with a digging-fork with round prongs. It should be somewhat worn, so as to be stiff and handy. The fork should be thrust well down if the weeds are of the dandelion nature. Then put one foot just beyond the weed, on the opposite side to the fork. This will prevent too large a block of earth being lifted when the handle of the fork is pressed down; if a large block is lifted the weed-root will not loosen easily. After all the weeds are out the lawn should be lightly rolled. Then scatter seed in bare patches and top-dress with suitable soil. Further rolling should be left until rain has washed in the soil and the grass has made a little growth; then level the soil with the back of a rake, and roll.

ANSWERS TO CORRESPONDENTS.

CORRESPONDENTS are requested, when desiring information through the Journal in regard to disease in animals and plants, to forward, where possible, affected specimens, in order to facilitate a correct diagnosis of the trouble and to ensure the best advice. In stating a question the most complete descriptive details should be furnished.

Correspondents desiring information in regard to manurial treatment of soil are requested to fill in and forward the prescribed form—"Application for Advice as to Manurial Treatment of Soil"—obtainable from any office of the Department in the Dominion.

In every instance a question to which an answer is desired in these columns must be accompanied by the full name of the inquirer, not necessarily for publication, but as a guarantee of good faith.

PASTEURIZING CREAM.

H. F., Waikouaiti :—

Would you kindly give me information as to how to sterilize cream for butter? In winter-time the butter is sometimes bitter, and does not keep as in summer.

The Dairy-produce Division :—

The simplest method of pasteurizing cream at a farm-dairy is to place the cream in a tin vessel, such as a small cream-can, and then place it in a copper of boiling water, allowing the water to reach to the level of the cream. It should be allowed to stand in this boiling water until the temperature reaches from 176° to 180° F., after which it should be immediately removed into cold water, and cooled to at least 60°. It is most essential that the cream be stirred frequently during the processes of heating and cooling, and the latter operation should be effected as rapidly as possible.

It is not necessary to sterilize cream for butter-making—in fact, it is practically impossible to do so except in a laboratory. No doubt the inquiry relates to pasteurizing.

CULTIVATION OF WHEAT.

"FOWL WHEAT," Okania, Matamata :—

I intend to sow 2 acres of wheat for my fowls. As I have never grown wheat, I will be much obliged if you would let me know—

1. What is the best variety to give the most corn.
2. How much seed to put to the acre.
3. The time to sow.

I suppose the cultivation and method of sowing is the same as for oats.

The Fields and Experimental Farms Division :—

1. Red Marvel is an excellent spring wheat, giving a large yield, and would probably best suit your purpose. Others are White Marvel, Burgoyne's Fife, and Yandilla King.

2. Sow 3 bushels to the acre.

3. Sow about the 1st September. A well-worked-up seed-bed should be provided. Roll when about 4 in. high, to encourage tillering. If the crop is backward in coming away, top-dress with 2 cwt. nitrate of soda per acre.

Plant for Identification.

Mr. R. Murrell, Manapouri:—

Will you please identify the enclosed leaves, &c.? The plant has been growing for about forty years on an island in the Waiau River, and is certainly not an introduced plant of recent years. Is it likely to be *Brassica oleracea*—common to southern Europe?

The Biologist:—

The plant sent is a native known as the yellow soldier's button *(Cotula coronopifolia)*. This weed is widely distributed throughout New Zealand in marshy land and on the edges of streams, lakes, &c., it often being submerged for considerable periods. It is not looked upon as possessing any virtues, but, on the other hand, cannot be ranked as a noxious weed.

Western Wolths Grass.

John Deroles, Hinau, Feilding:—

I have a small paddock of Western Wolths grass just up about 1 in. high. Would it improve the paddock to feed it off with sheep when it is about 3 in. high, or leave it right through the winter for spring (feed) for the cows? Oats improve with feeding off early with sheep. Does this grass?

The Fields and Experimental Farms Division:—

Except where the stand is a thin one we should advise leaving it until spring. If thin, feed off in about a month from now, as this will cause the grass to stool out better.

Lucerne.

"Subscriber," Te Houka:—

Would it benefit lucerne to top-dress it with an old wheat-stack bottom during winter?

The Fields and Experimental Farms Division:—

Top-dressing lucerne with an old stack-bottom as a protection against frost, and as a means also of manuring, would be found beneficial. There is, however, a danger of introducing an abundance of weeds. Provided the previous grain-crop was clean, it would be advisable to use the remains of the stack, otherwise dung made with clean straw or straw itself should be used. Too heavy a covering in winter, especially if there is scant growth of lucerne, would have the tendency to smother the crop.

Millet.

"Bromus," Auckland:—

Could you kindly inform me whether the so-called "millet brooms" are manufactured from a true millet *(Sorghum)* or whether this millet is really a species of the Brome family, such as broom-corn? Also, if millets are used, which is the most suitable variety?

The Fields and Experimental Farms Division:—

Brooms are manufactured from the non-saccharine variety of *Sorghum* or millets, commonly known as broom-corns. The best varieties are Californian Golden Broom Corn, Early Japanese Broom Corn, and Improved Evergreen Broom Corn.

BARLEY AND TARES.

"SUBSCRIBER," South Norsewood:—

Will you please inform me whether it is injurious to cut in May Cape barley and tares that were sown during the last week in February? I sowed 3 acres, and 2 cwt. superphosphate to the acre, with the barley and tares. It came away splendidly, and will be fit to cut in a week or two, but we have very severe frosts here in winter, and cold winds. Would it come away again in spring? I would like to have the feed now for the cows.

The Fields and Experimental Farms Division:—

You may cut the Cape barley and tares in May, and secure further cuttings of barley next spring. The tares, of course, will not come away again. It would be as well to start cutting the green feed early in May, so as to give the second growth every chance, as early and severe frosts may go hard with the new growth.

COMPLAINT OF HORSE.—SHEEP SUITABLE FOR WEST COAST LANDS.

"NEW CHUM," Whangape, North Auckland:—

1. I have a horse that has had a bad back. The sore has healed, and in its place there is a small lump about 1¾ in. long by 1 in. wide at the base. It is of a spongy softness to touch, and seems to be under the skin, as the hair and skin are intact over it. Kindly state how I can remove it. Will a blister (cantharides) be of any use; or must a knife be used to open it up?

2. Would a Merino-Romney cross in sheep be suitable for west-coast lands; and, if not, what breeds would you recommend?

The Live-stock and Meat Division:—

1. Try painting the part with iodine liniment. This should be applied every day until a "scurf" forms. When this peels off, apply the liniment again. If the "lump" shows no signs of reduction at the second peeling have it dissected out

2. This is a good cross, but whether the Merino would do well it would be hard to say, as they do not stand wet damp land, and this is the condition your lands generally are in in the winter season. We presume your objective is wool and mutton, and not lamb. A good authority on sheep in North Auckland states that for wool and mutton there is no better system of breeding than to put a half to three-quarter bred Romney-Lincoln ewes to a Romney ram. We advise you, therefore, to do this.

PLANT FOR IDENTIFICATION.

MR. R. MURRELL, Manapouri:—

Kindly tell me the name and use of the enclosed plant.

The Biologist:—

The plant sent is wild melilot, or King Island clover (*Melilotus arvensis*), a common clover in waste places near the sea. It is claimed to be a valuable fodder plant; but my experience is that stock refuse it, on account of the bitter taste of the leaves.

PIGEON-GRASS.

W. J. C., Matakanui, Otago:—

I enclose a stem of grass found in my garden. Apparently there are hairs in place of the ligule, a peculiarity I have never noticed before. Please let me have some information about it.

The Biologist:—

The grass sent is pigeon-grass (*Setaria viridis*), a not uncommon grass in certain localities. It has no economic value, and is generally looked upon as a weed. The seeds are common impurities in clover-seeds, especially those of American origin.

SHEEP-BREEDING.

MR. C. F. M. ROSS, Mataimoana, Waverley :—

Will you tell me at what interval a ewe—Romney-Lincoln—comes in season, how long it remains so, and how often during the tupping period it may be expected to come in season ? What conditions are favourable, or the reverse ?

The Live-stock and Meat Division :—

Ewes come into season generally about every fifteen to twenty-four days, and the condition lasts twenty-four to thirty-six hours, disappearing, however, if the ewe has conceived. The heat usually reoccurs about four months after lambing, when the ewe ceases suckling the lamb. Favourable conditions would consist in good, but not fat, condition of the ewes, proximity of the ram, and good climatic conditions during the tupping season.

DISEASE AFFECTING JERSEY BULL.

MR. A. SMITH, Urenui :—

I have a young Jersey bull which has had the pox very badly. He is now cured. Is there any danger of the disease returning when put to service next spring ? He is a valuable animal from a butter-fat point of view, and I am anxious to breed from him if possible.

The Live-stock and Meat Division :—

No.

MIXTURE FOR PERMANENT PASTURE.

"SNOW-GRASS," Waiouru :—

1. What is the best mixture for permanent pasture ?

2. Could you suggest any grass likely to do without manure, or one that will stand severe frosts ?

The country is of light pumice formation, with about a foot of black subsoil. The climate is very severe at times, and snow is frequent in the winter months.

The Fields and Experimental Farms Division :—

The following mixture should give good results as a permanent pasture mixture for your class of soil :—

	Pounds per Acre.
Cocksfoot	14
Italian rye-grass	4
Tall oat-grass	3
Chewing's fescue	3
Red-top	2
White clover	2
Red clover	1
	29

FLOWER-CULTURE.

"AN AMATEUR," Napier :—

My chrysanthemums, as well as those of several of my friends, are badly affected by rust. Not only are the leaves dropping off, but, probably owing to the same cause, the buds in some instances are decaying ; and others, when almost half opened, remain stationary for a time, and then gradually die off. The height of my plants is abnormal, some of the taller varieties being quite 9 ft., and others tall in proportion. Would you please tell me—(1) how to prevent rust ; (2) how best to combat the evil after it makes its appearance ; and (3) what can be done to keep my plants a reasonable height.

The Orchards, Gardens, and Apiaries Division :—

To combat chrysanthemum-rust, the plants should be sprayed several times at intervals of ten days with soda Bordeaux made according to the following formula : 2 lb. bluestone, 2 lb. washing-soda, 40 gallons of water.

It would appear from the description given of the state of your plants that the surrounding conditions are very unsuitable. Their growing to such a height is caused by excessive manuring, and they are probably drawn up by being grown in a shaded situation. Both conditions would tend to produce unhealthiness.

If possible, renew the soil they are growing in, and replace with some good soil from the hill, such as can be skimmed from a grass paddock. Stack it up until the grass has rotted.

You have been using not only too much manure, but manure of the wrong kind. Nitrogenous manures, such as bone and blood, fowlyard and nightsoil, would force them to stalk and leaf. Try basic slag, followed later by superphosphate, and keep the plants a fair distance apart—say, 2½ ft. every way. Basic slag may be used 4 oz. to 6 oz. to the square yard ; superphosphate, 3 oz. Should they want a little forcing, use sulphate of potash—½ oz. to a gallon of water, applied when half-grown. When the plants are about a foot high apply soda Bordeaux mixture—the 3-5-50 formula.

The best means for obtaining strong, sturdy growth is abundance of light and avoidance of overmanuring.

MAKING WINE FROM CHERRIES.

A. D., Jerusalem, Wanganui River :—

Kindly advise me how best to successfully carry on wine-making from cherries. There are several hundreds of cherry-trees on the place, and these are very consistent croppers, so that there would always be ample fruit for the purpose. The reason why we have to resort to this course is chiefly because of the deterioration of the fruit through transit to market. Kindly state also whether there is any restriction placed on home wine-making by the Government of this country.

The Orchards, Gardens, and Apiaries Division :—

The following is a recipe for making wine from cherries :—

Remove the stalks of the cherries, and then make a pulp of the fruit without breaking the stones. The pulp should then be passed through a sieve. To every 25 lb. of the pulp add 5 lb. of sugar, together with 5 oz. of cream of tartar and 1 gallon of water. Stir the whole, and make a homogeneous fluid. Place the vessel in a room where the temperature is from 65 to 70 degrees F., and cover the same with a cloth. After about twenty-four hours the liquid will begin to ferment. When the fermentation has subsided (which can be judged by the cessation of bubbling) the liquid should be separated from the pulp, and the former (which is now wine) is stored away in a cask and kept in a cool place. The storage-vessel should be kept full either by adding more of the cherry-wine, or else good, sound grape-wine, red or white.

The tub in which the cherry-juice is placed to ferment and the vessel in which the cherry-wine is afterwards stored should be very clean. A good way to clean them is to wash them once or twice with water in which washing-soda has been dissolved in the proportion of 1 lb. of the latter to 2 gallons of water. The vessels are washed again with water, to a gallon of which a wineglassful of sulphuric acid has been added. All vessels should then be rinsed two or three times with fresh water.

There are no restrictions placed on home wine-making by the New Zealand Government.

DISEASES OF SHEEP.

"INQUIRER," Sherwood Downs, South Canterbury :—

Last season I lost the use of a Border Leicester ram through his testicles becoming very much swollen and inflamed, and this year another one is in the same plight. Could you advise me as to the cause and treatment.

Since marking I have lost a number of lambs with the "staggers." Some of them appeared to take ill and die in an incredibly short time, while others were sick a day or two before dying. I constantly changed the paddocks without effect, and they died the same whether they were given salt or not. I hold that it is caused by a fungus on the grass in wet seasons? Is this so, and is there any remedy at all?

The Live-stock and Meat Division:—

The ram is evidently suffering from orchitis or inflammation of the testicles. This is probably due to injury by crushing or bruising, as sheep rarely suffer from venereal disease. Treatment would consist of giving a laxative—say, 4 oz. of Epsom salts with two teaspoonfuls of ground ginger in a pint of thin oatmeal gruel. The testicles should be well fomented three or four times a day, and rubbed with belladonna ointment. Afterwards suspend the organs by means of a linen bag lined with cotton-wool, the ends being tied over the loins. If there is much inflammation the gland structure may be so much damaged as to render the animal useless for stud purposes, and without he is valuable the best way probably would be to castrate him at once. With regard to the lambs with "staggers," it is difficult to say what was the cause. You do not say how long after marking they began to die. It may have been due to the operation. What you should have done when the lambs began to die was to notify the Inspector of Stock of your district, who would, if necessary, have asked a Veterinarian to examine the lambs, and the cause of death might have been determined. As it is, it is only speculation to say what caused the loss.

Insects in Currants.

"Subscriber," Westport:—

I am sending you for identification some grubs or insects found in a case of currants last year's crop from Greece. Are the presence of these things in the currants sufficient to condemn them? I noticed some time ago where New Zealand peaches sent to San Francisco were condemned on arrival on account of an unknown moth being found in the cases.

The Biologist:—

The specimens sent are the larvæ of the meal-moth (*Plodia interpunctella*), an insect commonly found in various dried fruits. This moth is not included in the Schedule of the Orchard and Garden Diseases Act, and consequently this Department's Inspectors could not take action, but if the insects are present in anything like a quantity, this alone should be sufficient to condemn the line commercially.

Soil Mouldiness and Toadstools.

"Solanum," Wairau Valley:—

Will you kindly let me know the cause and cure of the mouldiness in the soil enclosed under separate cover? There are three or four patches in the garden of Lansdowne Station, and I notice a fresh one starting in a flower-border. Would a dressing of salt have any effect? Also there is a large *Cupressus Lawsoniana* on the lawn, and lately it has a ring 14 ft. in diameter of toadstools round it. There are also some three or four much smaller rings in other parts of the lawn. Could you tell me if the grass will die out, or whether I can do anything to get rid of them? The grass is Chewing's fescue.

The Biologist:—

The "mouldiness" complained of consists of the spawn or mycelium of one of the higher fungi belonging to the mushroom group, and is probably the same one that is attacking the grass. In New Zealand several species of *Marasmius* form fairy-rings on lawns and pastures. When a fairy-ring once commences it increases in diameter from year to year, the mycelium steadily growing outwards and dying in the centre. Some species live almost entirely on the humus in the soil, while others are distinctly parasitic on the grass-roots, and gradually kill out the plants.

The best treatment is to saturate thoroughly all the affected soil with a solution of sulphate of iron (1 lb. to 1½ gallons of water). If the ground is dry it should be well soaked with water before applying the sulphate of iron. Two or three treatments at intervals of a few weeks are generally necessary. When rings on lawns are treated care must be taken to saturate the ground considerably beyond the zone where the fructifications (mushrooms) are developing, as the living mycelium is always present in the ground a certain distance beyond where the ring apparently ceases. If the lawn is particularly hard, forking over the rings to a depth of about 4½ in. enables the iron-sulphate solution to soak the ground readily.

Weed for Identification.

"Subscriber," Matiere :—

Kindly say what the enclosed weed is, and to what extent it is noxious.

The Biologist :—

The weed sent is yarr, or spurrey (*Spergula arvensis*), a very common weed on cultivated land. It is especially serious in Southland among winter-sown cereals, and is frequently termed "devil's weed." Ploughing, followed by harrowing, when the spurrey is young, and then repeating these cultural operations as soon as a second crop appears is often necessary where the ground is very foul. A hoed root crop is a good one to grow on land subject to the weed, or it may be laid down in clover and grass. Spurrey-seed is a very common impurity in imported clover-seeds. In parts of Europe, especially in Belgium, spurrey is looked upon as a valuable crop both for fodder and green manure; but to the New Zealand agriculturist it is an unmitigated weed, and, if left unchecked, may seriously reduce the yield of the crop.

Parasitic Disease of Plant.

Mr. A. S. Smith, Kimbell :—

Under separate cover I post specimen of plant—and adhering pest, parasitic—which I think advisable to have investigated. Would you please be good enough to advise per columns of your *Journal*?

The Biologist :—

The plant received is attacked by dodder (*Cuscuta epithymum*). This species of dodder is often common on gorse and broom, but does not in many cases kill out the affected plants.

Orchard and Garden Pests.—Potato-disease.

S. M., Retaruke, Waitieke :—

What is the best way to get rid of slugs and caterpillars? I have a garden on a bush section, and all my green stuff and tomatoes have been eaten up by these pests. As we are twenty-six miles from the railway, it makes lime very expensive, and we have to use pack-horses for part of the way.

I am sending you a potato: is it attacked by the ordinary potato-blight? If not, I should be glad of a remedy.

The Orchards, Gardens, and Apiaries Division :—

For slugs, Clift's manurial insecticide is said to be an effective remedy. To prevent loss of crop occasioned by the ravages of tomato-caterpillar, spraying with arsenate of lead, in the proportion of 1½ lb. to 50 gallons of water, is recommended.

The specimen potatoes forwarded have been attacked by potato-*bacteriosis*. As infection is carried from plant to plant by leaf-eating insects it is advisable to spray with an insecticide such as arsenate of lead, using the same strength as that recommended for the control of tomato-caterpillar.

Apple-growing.—Vegetable-culture.

Mr. J. E. Williams, Waimangaroa Junction :—

1. As I am intending to plant some apple-trees I would like you to state what kinds are most suitable for this coast. The ground is very sandy and fairly well sheltered. The weather-conditions, you will know, are fairly wet.

2. Would cabbage be affected by water ?

The Orchards, Gardens, and Apiaries Division :—

1. You do not state what number of apple-trees you propose to plant, or for what purpose—whether for commercial or domestic purposes.

2. Cabbage, like most other vegetation, does not thrive in water-logged soil.

Removal of Pinus Radiata.

"Northern," Canterbury :—

I have 3 acres of *Pinus insignis* trees ranging in circumference from 2 ft. to 6 ft., and in height from 40 ft. to 60 ft. They are growing on first-class wheat-land, and I wish to remove them. Would you please advise which method, in your opinion, is the cheapest to adopt in their removal. Are there any chemicals that can be used to saturate the stumps so that they can be removed within a reasonable time after use ?

The Orchards, Gardens, and Apiaries Division :—

The most economical method of removing the trees would be with dynamite or some other suitable explosive. Chemicals have been tried for the purpose suggested, but without successful results.

Overrun.

"Subscriber," Piopio :—

In calculating the overrun at the butter-factory, would 82 lb. of butter-fat producing 100 lb. of butter give an overrun of 18, or would 100 lb. of butter-fat, producing 118 lb. of butter give an overrun of 18 ? In other words, is "overrun" a percentage, or is it so much on the hundred ?

The Dairy-produce Division :—

By the "per cent. of overrun" is meant the quantity of butter made in excess of every 100 lb. of butter-fat received and made into butter. When the overrun is 18 per cent. it means that from every 100 lb. of butter-fat 118 lb. of butter is made.

If 100 lb. of butter is made from 82 lb. of butter-fat, the percentage of overrun would be 21·95. To find the amount of overrun, subtract the butter-fat received from the commercial butter made from it, then multiply the difference by 100 and divide by the quantity of butter-fat, thus :—

Pounds Butter.		Pounds Butter-fat.	
100	—	82	= 18

18 × 100 = 1,800

1,800 ÷ 82 = 21·95.

Chou Moellier.

"Home Separator," Hopai Road, Hauraki Plains :—

Would you kindly inform me whether chou moellier taints cream, as directors of factories are issuing orders not to take supplies of cream thus affected, as tainted butter is affecting our Home market ?

The Dairy-produce Division :—

Replying to the above inquiry, it may be pointed out that chou moellier can be fed to milking-cows without causing any harmful effect to the flavour of the milk given by the animals. In order, however, to guard against this objection, the cows must be fed immediately after milking, and in reasonable quantities. It will not do, for example, to allow the cows to feed on chou moellier throughout the day, for if this happened the milk would be affected just in the same way as it would be when the animals are given some other foods in too large a quantity.

BARLEY-SEED.

MR. JOHN TAYLOR, Box 10, Mataura :—

I am forwarding three samples of barley under different cover. Can you tell me their names? They are numbered 1, 2, and 3. When I bought the seed I was given the same name for them all.

The Fields and Experimental Farms Division :—

No. 1 sample is what is generally known as "Gisborne" barley, No. 2 as "Standwell" barley, and No. 3 as "Chevalier" barley.

CALF-REARING.

"EXPERIMENTER," Ohapuhu :—

Can you inform me how to prepare linseed-jelly for feeding calves, as used at Weraroa? This year we boiled linseed, six cups to a kerosene-tin full of water. Should the seed that settles at the bottom of the tin be given to calves? How much should be fed per calf?

The Fields and Experimental Farms Division :—

Linseed is generally prepared by boiling until the seed-capsules have burst and a jelly or mucilage has formed. There is really no necessity for boiling unless it is wanted in a hurry. The jelly may be formed by soaking the flax-seed in warm water for twelve hours, or, better still, pouring the boiling water on and allowing to stand overnight. The proportions required are about 1 lb. of seed to 1 gallon of water: this will depend on the quality of the seed. The quantity made should not be more than is required for two days, otherwise there is a tendency for it to become sour. For feeding to young calves in skim-milk, one tablespoonful will be sufficient to begin with, increasing up to half a pint.

LUCERNE.—OATS AND MAIZE.

MR. J. E. WILLIAMS, Waimangaroa Junction :—

1. What kind of lucerne would you recommend to try as an experiment? Soil is about 15 ft. thick, with a further depth of sand. At present it is covered with water. In flood-time it is sometimes covered to a depth of 3 ft., and the water lies about two days at a time. It is flooded about ten times per annum. It is backed-up water, gradual rise and fall, with no current at all. I am hoping by drainage to get rid of the water in a short time.

2. Would oats, maize, &c., grow? Which would be the best?

The Fields and Experimental Farms Division :—

Provided you carry out adequate drainage, thereby lowering the water-table to 5 ft. or 6 ft. from the surface of the ground, you can grow lucerne successfully, in which case Marlborough-grown seed, or the Hunter River variety, should suit your purpose. As the ground is at present subject to continued flooding, it would not

be suitable for growing lucerne, for this crop cannot resist waterlogging. Hence the tendency to flooding would require to be eliminated before success could be hoped for.

The same principle applies to practically any crop. Provided adequate drainage is carried out, oats undoubtedly would grow. Maize also should grow well on this class of soil provided there is sufficient sunshine (hence heat) during the growing period. In the event of this latter factor (heat) being deficient, oats, turnips, and rape would probably grow best. The soil will probably require liming after the drainage is effected. Should you get the soil into good condition physically for growing lucerne, an application of, say, 5 cwt. per acre of basic slag and 4 cwt. of kainit will greatly stimulate growth. Work into the soil some time before sowing the lucerne.

Potato-grub.

G. Emtage, Warkworth :—

Is there any solution potatoes could be soaked in in order to kill potato-grub ?

The Orchards, Gardens, and Apiaries Division :—

Dipping will have no effect on grubs which are inside potatoes unless the tubers are kept under water for several days. It is advisable to use only clean, sound potatoes for seed.

Trouble with Heifer.

" Holland " :—

Would you, please, in the next issue of the *Journal* state what could be the cause of a heifer two years and four months old slipping her calf within four months of her time being up ? Would it harm her in the next year's calving ?

The Live-stock and Meat Division :—

It is difficult to say. If your other cows are healthy and the heifer has not been in contact with aborting cows it is probable that the abortion may have been due to ordinary causes, and will not affect her next calving. It is best, however, to look upon all abortions as being due to contagion, and treat them accordingly.

Sour Milk.

" Subscriber," Canterbury :—

Would you please say why the Department condemns sour milk for pigs. What are the dangers of its use ? Many experienced farmers in this district never use anything else but sour milk, and their pigs thrive.

The Live Stock and Meat Division :—

The reason why the Department does not recommend sour milk or sour-milk products is that it is not a condition in which nature intended such food to be given to the animal. Most animals have been provided with a stomach in which certain glands secrete a milk-curdling ferment, and this is quite sufficient for the purpose of preparing this food for the action of the digestive fluids proper and its subsequent absorption. We are aware that in some districts it is the custom to feed both claves and pigs by products soured to such a consistence as to allow their being cut with a knife. Usually the result is persistent diarrhœa, detrimental to the health and growth of the animal, without some nitrogenous matter has been given in addition. If the souring of milk were simply due to the lactic-acid bacillus, probably no great harm would result, but there are other more deleterious organisms which act in the same way, and their presence, together with their products, or " toxins " as they are termed, may give rise to serious trouble. The cramps, lameness, and other conditions usually termed rheumatic, which are common in young pigs and usually put down to cold and damp, may, after all, be due to acidity. Regarding the pigs

that you say are fed wholly on sour skim-milk and are thriving, they must surely get something else, as the only feeding substance in the stuff is lactose or milk-sugar—a carbohydrate and non-nitrogenous substance.

TUBERCULOSIS IN PIGS.

"NEW CHUM," North Otago :—

Some time ago I killed a pig, and the Inspector condemned it as being tuberculous. I bought four pigs last October, and in January I bought four more—small weaners. We had ten days very wet weather after I bought the last pigs, and the sty got very wet and sloppy, as I had not sufficient straw to keep the bed in good order with such an unusual amount of wet, and the result was two of the younger pigs died. The pig condemned was the first one killed of the four big pigs.

1. Is it probable that the rest of my pigs will have the disease ?
2. If so, can I tell before the pigs are killed, and how ?
3. If I cannot tell before the pigs are killed, can I find out when killed before I send them away with their heads on, and how ?
4. If I cannot find disease before cutting up a pig, how would I find out if it has disease ? I cure a couple for myself each year, and wish to know where to find the disease and its symptoms.
5. If I killed a pig for my own use and found it had tuberculosis, would the Government give me compensation for same ? If so, how would I apply for it ?
6. If I find that more of my pigs have the disease, would it be advisable to kill off all the pigs, and fumigate the sty and troughs before buying other pigs ?
7. If so, how would I fumigate ?
8. Would they still be liable to pick up germs of the disease from the run ?
9. Is it probable the pigs caught the disease through sleeping in a wet sty ?

The Live-stock and Meat Division :—

1. Yes, there may be another or more affected if they have been living together and had the same kind of food.
2. No, we do not think you could.
3. Yes, you could if you were familiar with the disease and knew the situation of the different lymphatic glands.
4. The submaxilliary and other glands of the throat are most often found affected, although the disease may affect the bronchial mediastinal and mesenteric glands. The pleura and peritoneum may also be affected, and occasionally the bones of the spinal column.
5. Yes, but you would have to ask the Inspector of Stock of your district to examine and condemn the pig.
6. Yes.
7. You need not necessarily fumigate ; scrubbing the walls, &c., with a strong disinfectant would be sufficient. If the sties are old it would be better to burn them and erect new ones.
8. If there are any tubercular cattle on the run, the pigs might become infected, as such cattle often pass large quantities of tuberculous organisms with the fæces, and the pigs get the disease in ingestion.
9. No. The disease is caused by the introduction into the system of the tuberculosis organism. The cold and wet conditions, however, may have rendered the pigs more liable to the germs establishing themselves, owing to lowering the vitality of the animal.

SHOWER-DIP FOR SHEEP.

"SUBSCRIBER," Gisborne :—

I have been told that a shower-dip for sheep can be made for about £10, and that it is better and easier to work than a walk-in dip. Can you give me any information, or tell me where to get particulars ?

The Live-stock and Dairy Division :—

The idea is absolutely impracticable.

THE HEMP INDUSTRY.

W. H. Ferris.

Many mills throughout the Dominion have closed down for the winter months, principally with the object of giving the phormium plants a rest, and to obviate the damage to the plants which too often follows the cutting of these at periods when heavy frosts are experienced. This policy of conservation is to be heartily commended. Much of the leaf now being cut is from scattered plants, the permanency of which is not considered of any importance. Practically all mills, with the exception of a few in the Auckland District, will be closed down by the end of the present month. With the splendid condition of the leaf in the great majority of flax-growing areas and the better care being now taken of the swamps a fine crop of leaf should be available for next season, assuring a quality of raw material which should easily be converted into high-grade fibre.

The quality of the fibre received at the grading-stores last month was of a very satisfactory standard, the best average fibre received this season. This was largely due, no doubt, to the working of a better leaf, but there were indications in many instances that improved work had been done in several stages of the milling process. There is still a dominant weakness—poorly stripped tails, these being towy and knotty, a condition which no scutching will improve. The cause, of course, is in the actual stripping, the stripper either not being kept tuned up to the best pitch or the desire to put more leaf through the stripper than this will take. In several lines improvement has been noticeable, clean tails having taken the place of the formerly matted ends.

On a visit to the Te Puke (Bay of Plenty) district I was more than surprised to find that the mills in that part of the Dominion —six in all—are quite up to date not only in the buildings and the machinery, but in the arrangement of the former and the setting-up of the latter. All the plants are driven on the suction-gas principle. During the strike period, when it was found impossible to secure sufficient coal, two millers made an interesting discovery. They secured some manuka scrub and cut this into about 2-in. lengths. This was found a satisfactory substitute for the coal, the gas produced being of a fairly good quality. Even when the coal

became available the use of the manuka was continued. One advantage in using the manuka was that the tar trouble was eliminated. The scrub is cut up with a circular saw. The majority of the millers are turning out a good, bright clean fibre, this being fairly well stripped and of excellent colour, the weakness being the common one of the South—knotty tails. The millers have good leaf-bearing swamps—no trace of blight being observable —which, however, require better attention in the direction of draining and cleaning up. The largest swamp in the district is capable, under proper management, of producing as much leaf as the whole of the Manawatu swamps. It is yet in its natural state, but the proper drainage of it is now being undertaken. The possibilities of the district from a phormium-fibre viewpoint are very great. The Te Puke mills are situated on the banks of the Kaituna River, and the fibre is loaded direct into scows which take it to the Auckland port. The raw leaf is also conveyed to the mills down the river in barges towed by oil-launches. At present only the fringe of the swamps on the banks of the river are being cut. I have to thank Messrs. McEwen and Tait for their kindness in piloting me through the district.

Messrs. Suttie and Wynyard's automatic scutcher promises to prove a success. Experimental work is still in progress, but even in its present form the method is an improvement on the present system.

The tow of last month was still of a poor quality, altogether too much dust and rubbish being baled. Very few lines were of first grade, the majority being but third grade. Very few parcels of stripper-slips came to hand, but those that did were of a very inferior description, a quality which will certainly not improve the demand for this by-product.

The Agricultural Department of the Philippine Islands contemplates establishing a compulsory official system of grading Manila hemp on the lines of the New Zealand system.

Before the planting season last year the officers of the Orchards, Gardens, and Apiaries Division estimated that 2,420 acres would be added to the orchard area of the Dominion. These figures have now been checked against the areas planted, and we find the figures work out 2,497 acres actually planted last year. The estimate of the coming season's planting operations is 2,849 acres. The areas in acres for the different districts are as follows: Whangarei, 35; North Auckland, 350; South Auckland, 55; Auckland suburbs and Poverty Bay, 25; Waikato and Bay of Plenty, 43; Hawke's Bay, 150; Taranaki, 20; Manawatu and Wairarapa, 60; Hutt, 7; Marlborough, 500; Nelson, 1,000; Christchurch suburbs, 4; North Canterbury and Westland, 200; South Canterbury, 100; Otago and Southland, 300.—*T. W. Kirk.*

THE FRUIT CROP.

THE officers of the Orchards, Gardens, and Apiaries Division report as follows on the condition of the fruit crop at the end of April :—

WHANGAREI.—Apples : A heavy crop of late varieties harvested. Lemons : A very fair crop ; much improved by recent rains. Nectarines and peaches : Finished. Pears : Only very late varieties left ; quite up to expectations. Plums (English and Japanese) : Finished. Tomatoes : Very few to hand, and not satisfactory. Oranges : Prospects well maintained. The recent heavy rains have been very beneficial to citrus fruits. *Clasterosporium* is much in evidence this season, and growers would do well to get an autumn dressing of 10-10-40 Bordeaux on to affected trees. Several growers have already got their peach and nectarine pruning well advanced.—*J. W. Collard.*

AUCKLAND NORTH.—Apples : Late varieties in good supply ; mealy bug rather prevalent. Lemons : Fair crop ; good prices still ruling. Pears : Practically over. Tomatoes : Crop finished.—*W. C. Thompson.*

AUCKLAND SOUTH.—All fruits with the exception of late apples and Vicar of Winkfield and P. Barry pears have been marketed. Prospects for those varieties left are good as regards prices. Lemons : Good crop. Tomatoes : Last few now being packed. Rain has fallen every day this month with the exception of about four days, and, coming after a dry spell, has in many places caused a good deal of second growth.—*N. R. Pierce.*

HAMILTON.—Apples : Late varieties ripening satisfactorily ; prices very good. Lemons : Still scarce in markets ; crops developing well. Peaches : All harvested. Pears : Still in good supply ; late varieties still to harvest ; prices are very firm ; many lines slightly blemished by scab. Plums (Japanese) : Finished. Tomatoes : Getting scarce. Walnuts : Crops very light ; have not turned out as well as expected.—*T. E. Rodda.*

POVERTY BAY.—Apples : Late apples an excellent crop, and with the late summer rains have filled out considerably ; another 100 cases were shipped to the Argentine this month. Pears : In short supply. Lemons : Good show for coming crop. Walnuts : Have been good, although *Bacteriosis* has made a big reduction. —*W. R. Lloyd Williams.*

HASTINGS.—Apples and pears have been coming forward in abundance during the month, crop being quite up to expectations, and, on the whole, of first-class quality. Other classes of fruits are practically over. Preparations for the winter work in the orchard are now being made. Many growers have already commenced to prune their peach and plum trees.

MANAWATU AND WAIRARAPA.—Apples : Very good crops. Later varieties now being picked. Good deal of russeting in Sturmers, caused by Bordeaux mixture. Pears : Large crop all varieties ; very clean ; good prices being obtained in markets.—*George Stratford.*

WANGANUI.—Apples : Highest prospects realized ; a clean, well-coloured crop is being harvested. Apricots, cherries, gooseberries : In too many cases these are neglected after the fruit is gathered, and become a prey to fungus and insect enemies. Lemons : Prospects well maintained. Nectarines, peaches : The quality of the young wood augurs well for future prospects. Pears : Full crops of unusually clean fruit are being gathered. Plums (English and Japanese), raspberries, and strawberries : Over. Tomatoes : Very fair crops have been picked, but are now about finished.—*W. C. Hyde.*

WELLINGTON.—Apples : Good crop, well up to expectations, and should meet with good prices. Pears : Crops selling well. Tomatoes : Gradually slackening off ; prices good.—*T. C. Webb, jun.*

NELSON.—Apples : All midsummer varieties now harvested ; there still remain Sturmer, Washington, Etowah, Commerce, Epps Seedling, Dougherty, Roke-

wood, Rymer, Stone Pippin; there is a good crop of most of these varieties; Sturmers are not up to expectations, and are badly russeted with the Bordeaux spray. Pears are all gathered, and are in much shorter supply.—*J. H. Thorp.*

BLENHEIM.—Apples: Heavy crops; early varieties gathered; commencing to gather late varieties; considerable damage done by leaf-roller caterpillar. Apricots, cherries, gooseberries, nectarines, peaches: Crops all harvested. Pears: Heavy crop; harvested, with the exception of a few late varieties. Plums (English and Japanese), raspberries and strawberries: Crops all gathered. Tomatoes: Season just about finished; what fruit not gathered spoilt by frosts. Walnuts: Medium crop; harvesting in full swing.—*B. G. Goodwin.*

NORTH CANTERBURY AND WEST COAST.—Apples: Fair crop; all except a few varieties harvested. Apricots, cherries, gooseberries, nectarines and Japanese plums: Over. Grapes: Indoor, good crop; outdoor, fair crop; not grown to any extent; mildew prevalent. Peaches: Good crop; almost over. Plums: Almost over. Pears: Fair crop. Quinces: Fair crop. Tomatoes: Almost over; there is still a good quantity out, but they will be of little importance, as most of them have been affected by recent frosts. Walnuts: Light crop; disease rather prevalent.—*W. J. Courtier.*

CHRISTCHURCH CITY AND SUBURBS.—Apples: Only fair crop late varieties. Apricots: Wood ripening well, but not a successful fruit on flats, which are invariably caught by late frosts. Pears: Mid-season crop harvested; late varieties poor crop. Tomatoes: Outdoor crop shortened by severe frost. Winter tomatoes under glass are looking well, and will be coming in shortly. Walnuts: Poor crop.—*G. Esam.*

TIMARU.—Apples: The following varieties, good in quality and colour, are being gathered: Lord Wolsey, Stewart's Seedling, Rymer, Rome Beauty, Delicious, Sturmer Pippin. An apple that is doing well here is the Statesman, raised by the late Mr. Chandler, of Victoria. The fruit keeps well and is of good quality. The tree is a good cropper. Some Statesmans that I have seen in South Canterbury are equal in colour to those grown in Victoria. Pears: The following are now being gathered: Keiffer's Hybrid, Garber's Hybrid, Winter Cole, Winter Nelis (only a fair crop), Madam Cole, Uvedales, St. Germain, Black Ackan, and other late varieties. Winter Cole and Keiffer's Hybrid are carrying some crop. In the Fairview orchard of Messrs. Butcher Bros. Keiffer's averaged 10 bushels per tree. P. Barry is carrying on an average only a fair crop. Late spot (*F. pyrinum*), is in evidence in some varieties. Walnuts: Good crops of some French varieties; English seedling nuts are small in size. Blackbirds have been causing much havoc amongst ungathered fruit. They are present in quite large numbers, perhaps owing to the very cold weather that has been experienced. Hares, too, are beginning to pay attention to young trees. The weather during the latter portion of the month has been cold and wet.—*A. B. Mansfield.*

DUNEDIN.—Apples: Main crops being picked; a consignment of 60 cases was forwarded to South America early in the month; this was the first consignment on record to be exported from Otago. Strawberries: Being put in order and cleaned up; heavy plantings are being made throughout the district. Tomatoes: Frosts have ended what has been a good season.—*W. T. Goodwin.*

HONEY-CROP PROSPECTS.

THE Director of the Orchards, Gardens, and Apiaries Division has received the following reports on the apiary prospects from the Apiary Instructors:—

AUCKLAND.—As reported previously, the honey crop in my district was below the average. The quality this year, however, is good. Prices locally are in advance of last season's, due to the small crops obtained and the beekeepers exporting in bulk. First-grade honey in 2 lb. tins is bringing locally from 10s. 6d. to 11s. 6d. per dozen. A further shipment of honey is being exported this month.—*G. V. Westbrooke.*

Wellington.—The crop this year is an average one. Prices are firm, with a prospect of advance, due to the formation of a co-operative company in Taranaki. A large consignment for British ports is leaving the Dominion this month, and will be graded by the Government officers. It is possible that further consignments will be made later. Lithographed 2 lb. tins are becoming very popular. The Taranaki company have bought all the stock of the well-known apiaries of Mr. Lenz, of Masterton, and the hives will be shifted during the winter to Taranaki sites.—*F. A. Jacobsen.*

Christchurch.—The season is now over, and most beekeepers have finished preparing the bees to withstand winter. Better prices have been experienced for honey this season, thanks to the export trade. Quite a good consignment has been graded during the month, and there is already close on 8 tons at present to hand for next month's shipments. Much of our famous choice Canterbury honey is sent to Wellington, Auckland, and Dunedin, and commands good prices.—*L. Bowman.*

Dunedin.—The market is bare of supplies, very little honey being offered. A strong demand for bulk honey exists, auctioneers not being able to fulfil requirements. Complaints are general with respect to the packing of consignments arriving on this market. Second-hand packages and containers are still being used by the beekeepers, but the practice cannot be too strongly condemned, as prices in all cases are against the consignors. Bulk honey, 3¾d. to 4½d. per lb.; good sections up to 6s. 6d. per dozen; 1 lb. glass jars, 8s. per dozen. Beeswax is scarce, supplies not being equal to the demand; market quotation, 1s. 4d. per lb. *E. A. Earp.*

MARKET CONDITION OF LOCAL FRUIT AND VEGETABLES.

The Fruit Inspectors of the Orchards, Gardens, and Apiaries Division report as follows on the condition of locally grown fruit and vegetables in the shops and auction-rooms, and the market position of these, for the month of April:—

Wellington.—During the month of April all the local markets were visited every morning. Prices have been rather low during the beginning of April, due, no doubt, to the large shipments. There is, however, an improvement taking place. Good dessert apples are in fair demand, cooking apples are going up in price, pears are plentiful, and, considering the quantity arriving, the prices are fair. Tomatoes are advancing in price, and are in good demand. Small supply to hand. A few small lines of apples had to be condemned for scale and moth. Vegetables are in good demand. Cauliflowers are in small supply, with good prices. Cabbages are advancing in price. Onions are plentiful—£6 10s. per ton. Potatoes, £5 10s. per ton. All other vegetables in good demand.—*T. C. Webb, jun.*

Christchurch.—The quantity of local fruit has fallen off considerably. Apples and pears are now the mainstay of the markets, and these are only forward in limited quantities. Tomatoes are much firmer, and in short supply; a severe frost on the 23rd completely destroyed many large crops. Plums are finished, and peaches are about over. A few choice lines realized 2½d. per lb. A wide range in prices will be observed. Faulty and unfair packing is the main reason for this. Topping is most evident, hence greatly reduced prices. A good price is assured for first-class fruit that is honestly packed. Unfortunately, very little of this description reaches the Christchurch markets. Quotations for month are as follows: Apples, special dessert, 7s. to 10s.; good dessert, 5s. to 7s.; cookers, 4s. to 6s. 6d.; pears, dessert, 5s. to 6s. 6d.; cookers, 3s. to 5s.; quinces, 3s. 6d. to 5s., scarce; tomatoes, 2s. 6d. to 4s. 6d.; grapes, 10d. to 1s. 6d. per lb.; walnuts, 6d. to 7½d. per lb.; chestnuts, 2d. to 4d. per lb.; onions, £3 10s. to £3 15s. in paddock; potatoes, £3 10s. in paddock.—*Gordon Esam.*

Dunedin.—Throughout the month the markets here have been well supplied with all classes of seasonable fruit and vegetables. Only second-grade fruits are

arriving from Nelson district, as growers there are evidently shipping their best produce to South American markets. Stone-fruits are now practically finished. Tomatoes have been in very good supply until the latter part of the month, when early frosts cut supplies off considerably. The demand for dessert pears is keen, and any consignments coming forward should fetch profitable returns. The following are fair average prices for the month: Dessert apples (Jonathan, Cox's Orange, and similar first-class varieties), 8s. 6d. to 9s. 6d.; others, 5s. 6d. to 7s. Grapes, local hothouse, 9d. to 1s.; second quality, 6d. to 8d. Quinces, 4s. 6d. to 5s. 6d.; brisk demand. Tomatoes, 4½d. to 5½d.; second quality, 1¼d. to 1½d.—*C. Craigie.*

INVERCARGILL.—The Invercargill market has been well supplied this month with New-Zealand-grown fruits. Tomatoes, consequent upon a superabundant supply, have receded very much in value, and have been obtainable at very low rates throughout the month. The last of the peach crop is still in the market, and prices are easy. Apples and pears from Canterbury and Otago Central are in good supply, and mostly of fine quality. The consignments of Southland-grown apples and pears are of much better quality this month. Prices current in Invercargill during April: Apples (dessert) 6s. to 10s. per case, apples (cooking) 3s. to 6s. per case, pears 5s. to 9s. 6d. per case, tomatoes 1d. to 2½d. per lb., peaches 1½d. to 2d. per lb., grapes 6d. to 9d. per lb., quinces 1½d. to 2¼d. per lb., jam melons 7s. per cwt., potatoes £4 10s. to £5 10s. per ton, market advancing; potatoes (on trucks at country sidings), £3 to £3 5s. per ton; onions 7s. per bag, parsnips 2s. per bag, carrots 2s. per bag, cabbage 3s. 6d. per sack, cauliflower 4s. 6d. per sack, marrows 5s. per cwt., peas and beans 2½d. per lb.—*R. Hutton.*

The dates of agricultural shows will be duly published in the *Journal* on official intimation from the secretaries of the respective societies.

One of the advantages of the Government grading of honey seems to be apparent already, some consignments of choice Canterbury honey having been sold at £50 per ton, and agents at Home are getting "repeat" orders.—*T. W. Kirk.*

The Jersey Queen is the most promising variety of the seventeen mangels tested at the Ruakura Farm of Instruction this season. The Superlative is coming out the best of the twenty varieties of swede turnips.

Owing to competition in the freight world, farmers would be well advised to place their orders for fertilizers required during the coming season without delay, as they will thereby effect a saving of 10 per cent. A northern importing firm now quotes for delivery, spread over a year, free on rail Auckland, 17 to 20 per cent. slag at £3 8s., and superphosphate at £3 12s. 6d.

Mr. A. A. Corban, of Mount Lebanon Vineyard, Henderson, has introduced a bird-lime for the purpose of protecting grapes, &c., from small birds. This has been tested at the Waerenga Experimental Farm, with satisfactory results. A small tree was covered with sticks of the bird-lime, and tied to a post in the vineyard. In two hours seventy-seven white-eyes, which are so destructive to the grapes, were caught. There were eighteen birds on one stick. The bird-lime held blackbirds and thrushes equally well. Once they touch it there is no hope of their getting away. The lime is very easily manipulated, being handled with ease and cleanliness.

COMMERCIAL INTELLIGENCE.

AUSTRALIA AND NEW ZEALAND POTATOES.

CONDITIONS GOVERNING THE IMPORTATION OF POTATOES FOR FOOD PURPOSES.

The official Commonwealth conditions under which potatoes grown in New Zealand may be imported into Australia for food purposes until 31st December, 1914, are as follows :—

(*a.*) That the potatoes are accompanied by an official certificate identifying the shipment and certifying that they were grown in New Zealand, and that they have been inspected and show no signs of the following diseases :—

Phytophthora infestans (potato blight).
Synchytrium endobioticum (potato canker, black scab, warty disease, and cauliflower disease in potatoes).
Lita solanella (potato moth).
Cospora scabies (Thaxter) (potato scab).
Anguillulidæ (gall or eel worm).

(*b.*) That they are packed in clean, new bags.

(*c.*) That the bags, crates, or other packages are marked with the name of the country of origin.

(*d.*) That upon inspection at the port of discharge in Australia the potatoes are found free from disease and are so certified by a plant quarantine officer.

(*e.*) That no importation shall take place without the permission of the Minister given prior to the shipment of the potatoes from New Zealand.

Produce-merchants desiring to import should make application for the Minister's authority to the Chief Quarantine Officer for Plants, Department of Agriculture, Melbourne.

FOOD-SUPPLY PROBLEM.

THE POSITION IN AMERICA AND CANADA.

In a communication under date of San Francisco, 13th March, 1914, Mr. E. Clifton, New Zealand Commissioner to the Panama-Pacific Exhibition and Trade Commissioner on the west coast of Canada, writes as follows :—

A report received from Portland, Washington, by the *San Francisco Chronicle* on the 11th March advises that more than 10,000,000 eggs from China will reach British Columbia this week. These eggs are for distribution there and in the United States. The first consignment of 3,500,000 arrived on Sunday last by the Canadian-Pacific steamer "Empress of Asia," and 4,200,000 were delivered by the R.M.S. "Cardigan" there on the 14th. This is an earnest of the great demand for food products of every description. All this is by no means consumed on the Pacific districts; the great central plains of Canada are being supplied from this side. Vancouver and Seattle are the great receiving centres. It is

from these places that the grain-growers of Canada and the huge cities draw their supplies. Add to this the demand for foods in the lumber camps, the railway-construction outfits, and the salmon-fishery settlements, and the vastness of the trade may even then be but vaguely appreciated. The producers of New Zealand and Australia need be under no apprehension that their exports may become of too great a volume for absorption in these lands. Rather, they may fairly regard their present connection with these lands as the beginning of a great developing trade. We in outside countries fail to realize that Canada and the United States of America are so differently situated to either New Zealand or Australia—countries quite apart from others, having no immediate neighbours, and with the seas their boundaries. Here the boundaries are those of occupied lands whose people are pressing onward with all the power of amassed wealth, and with it the lust of applying that money to earn still greater wealth. This is where the impetus is derived that forces along these vast western countries. It is an example of progress that is undreamed of in New Zealand and Australia. This possibly is hardly associated with the question of egg-supply; but the volume of the importation of this product is a fair index of the development that is going on. It is, indeed, the clearest of all indications that to us in New Zealand a trade with Pacific markets is all important. But to return to our eggs. It is stated on good authority that the large consignments of eggs afloat, or to be immediately embarked, will bring up the number of eggs from China to more than the ten millions which were first stated to have been expected. The fact which will interest New Zealand perhaps more than this huge importation of eggs is that the imports of meat and butter are in increasing demand.

A comparison of the prices of butter and eggs with those of 1913 may be noted:

Butter.

	March, 1913.	7th, 9th, and 10th March, 1914.
1	1s. 6½d. per pound.	11½d. per pound.
2	..	11¼d. „
3	1s. 5¼d. per pound.	11d. „

Eggs.

Extras	8¾d. per dozen.	10½d. per dozen.
Fresh	8d. „	9¾d. „
Prime pullets ..	8¼d. „	9d. „

NEW ZEALAND - EASTERN PORTS U.S.A. TRADE.

FOLLOWING are the shipments of produce for the east coast of the United States since March last, when the new direct service was inaugurated by the s.s. Banffshire":—

	S.s. "Banffshire," 19th March.	S.s. "Roscommon," 21st April.
Mutton, carcases	..	1,500
Lamb, „	..	14,700
Beef, quarters	..	3,494
Veal, carcases	..	1,165
Frozen sundries, packages	..	50
Wool, bales	291	1,022
Hemp, „	1,548	1,992
Tow, „	171	..
Hides and skins, sacks, &c.	946	684
Pelts, casks	381	219
Grain, &c., sacks	90	298
Gum, packages	1,091	1,525
Sundries, packages	21	37

THE DOMINION'S EXPORTS TO BRITAIN.

COMPILED FROM MANIFESTS OF VESSELS SAILED DURING RESPECTIVE MONTHS OF CURRENT AND PRECEDING SEASONS.

Month.		Mutton, Carcases.	Lamb, Carcases.	Beef, Quarters.	Pork, Carcases.	Butter, Boxes.	Cheese, Crates.	Wool, Bales.	Wheat, Sacks.	Oats, Sacks.	Rabbits, Crates.	Hemp, Bales.	Tow, Bales.	Kauri-gum, Cases.
January,	1914	231,766	464,185	30,424	33	150,492	136,086	108,742	..	500	2,851	15,234	4,306	11,133
,,	*1913*	*166,714*	*229,179*	*6,886*	*611*	*109,251*	*63,864*	*118,986*	..	*329*	..	*6,969*	*2,215*	*4,110*
February,	1914	354,190	334,207	14,100	3	86,570	59,532	127,372	..	4	..	3,709	633	7,607
,,	*1913*	*326,337*	*403,698*	*12,666*	*54*	*89,098*	*81,733*	*127,968*	..	..	..	*12,520*	*4,295*	*7,973*
March,	1914	446,522	551,313	36,689	..	61,060	62,732	95,175	..	..	..	8,187	2,562	3,958
,,	*1913*	*86,224*	*210,166*	*7,428*	*250*	*47,560*	*59,844*	*49,661*	..	*115*	..	*12,552*	*7,662*	*4,043*
April,	1914	234,765	366,786	22,185	..	7,822	63,796	58,488	..	2,901	..	1,247	888	5,909
,,	*1913*	*303,937*	*647,948*	*16,834*	*457*	*11,358*	*52,934*	*61,988*	..	*300*	..	*9,049*	*3,351*	*3,889*
May,	1913	418,221	731,520	22,073	100	637	46,304	33,281	..	265	2,000	15,751	5,005	9,057
,,	*1912*	*454,506*	*744,287*	*32,691*	..	*1,441*	*40,535*	*51,833*	*11,157*	*26,569*	*1,500*	*11,963*	*2,826*	*6,287*
June,	1913	315,034	528,815	24,444	588	79	3,166	18,741	..	..	13,072	13,592	4,065	5,439
,,	*1912*	*170,738*	*287,697*	*24,605*	*221*	*558*	*7,712*	*18,138*	*9,160*	*7,622*	*2,039*	*5,646*	*1,168*	*1,213*
July,	1913	215,713	331,353	14,030	..	..	1,687	17,169	5,651	300	9,190	9,682	1,720	10,793
,,	*1912*	*291,097*	*371,474*	*29,457*	*210*	*684*	*1,255*	*16,567*	*44,324*	*23,216*	*20,573*	*7,463*	*1,856*	*5,892*
August,	1913	161,593	178,263	13,129	6	8	407	8,494	11,604	45	38,480	3,714	2,310	6,406
,,	*1912*	*207,239*	*157,589*	*10,478*	..	*559*	..	*10,409*	*42,580*	*38,802*	*19,562*	*3,758*	*523*	*4,219*
September,	1913	133,122	83,521	5,334	16	6,575	2,020	7,176	..	..	16,336	3,826	1,501	10,049
,,	*1912*	*44,657*	*40,759*	*1,174*	..	*8,723*	*1,204*	*6,671*	*15,742*	*17,363*	*19,933*	*2,957*	*501*	*3,671*
October,	1913	14,122	25,735	580	..	42,847	21,452	2,705	..	..	10,020	6,986	3,672	2,923
,,	*1912*	*51,263*	*15,393*	*3,882*	..	*49,962*	*16,389*	*4,647*	*7,952*	*64,480*	*5,395*	*4,193*	*401*	*9,075*
November,	1913	20	1,479	..	..	53,468	23,722	1,891	..	..	2,478	4,162	771	2,314
,,	*1912*	*54,175*	*8,286*	*282*	..	*140,751*	*57,181*	*33,305*	*3,680*	*40,896*	*13,892*	*9,866*	*1,911*	*5,466*
December,	1913	128,087	86,890	8,909	..	249,526	124,821	51,385	..	250	24,479	19,807	5,276	11,273
,,	*1912*	*117,740*	*106,310*	*4,774*	..	*119,885*	*66,213*	*44,789*	*5,868*	*30,490*	*10,070*	*3,816*	*2,613*	*3,686*

LONDON MARKET VALUES.

COMPARATIVE STATEMENT COMPILED FROM THE HIGH COMMISSIONER'S CABLES FOR THE THREE MONTHS ENDED 30TH APRIL, 1914.

London Date.	Wool. Bradford Quotations for Tops. 36's.	40's.	44's.	50's.	56's.	60's.	Mutton. Canterbury.	Mutton. North Island.	Lamb. Canterbury.	Lamb. Other than Canterbury.	Beef. Hinds.	Beef. Fores.	Butter. New Zealand.	Butter. Danish.	Cheese. New Zealand White.	Cheese. New Zealand Coloured.	Cheese. Canadian.	Hemp (Spot). New Zealand Good-fair.	Hemp (Spot). New Zealand Fair.	Hemp (Spot). Manila.	Hemp (Forward Shipment). New Zealand Good-fair.	Hemp (Forward Shipment). New Zealand Fair.	Hemp (Forward Shipment). Manila.	Wheat. Short-berried.	Wheat. Long-berried.	Oats. Sparrowbills.	Oats. Danish.
1914.							d.	d.	d.	d.	d.	d.															
Feb. 7	1/3¼	1/3½	1/4¼	1/7½	1/9¾	2/3¼	..	4¾	..	6⅝	4½	4	116/0	126/0	64/0	66/0	72/0	25/10/0	23/0/0	28/5/0	26/0/0	23/15/0	28/10/0	..	..	..	..
,, 14	..	..	..	..	..	..	..	4⅝	..	6½	4½	4	116/0	123/0	64/0	66/0	72/0	25/10/0	23/5/0	28/0/0	25/15/0	23/10/0	28/5/0	..	..	..	..
,, 21	1/3¾	1/4	1/4¾	1/8	1/10¾	2/4	..	4⅞	..	6½	4½	4	116/0	124/0	64/6	66/6	72/0	25/5/0	23/0/0	27/5/0	25/15/0	23/5/0	27/10/0	..	..	..	..
,, 28	..	..	..	..	..	..	..	4¾	..	6⅝	4½	4	118/0	126/0	64/6	67/0	72/0	25/5/0	23/0/0	27/0/0	25/10/0	23/5/0	26/10/0	..	..	..	..
March 7	..	..	..	..	..	..	..	4½	..	6⅝	4½	4	116/0	126/0	64/0	66/6	72/0	25/5/0	22/10/0		25/15/0	22/15/0	..	..	..	..	..
,, 14	..	..	..	..	..	..	..	4½	6½	6¼	4½	4	114/0	124/0	63/6	65/6	71, 0	25/5/0	22/15/0	26/10/0	25/15/0	22/15/0	26/10/0	..	..	..	..
,, 21	..	..	..	..	..	..	..	4½	6⅝	6¼	4½	3⅞	112/0	124/0	63/0	65/0	71/0	25/10/0	22/10/0	27/0/0	25/15/0	23/0/0	26/10/0	..	..	..	..
,, 28	..	..	..	..	..	..	4⅞	4½	6¼	6⅛	4½	3⅞	112/0	124/0	62/6	65/0	71/0	26/0/0	23/0/0	26/10/0	..	..	26/10/0	..	..	..	..
April 4	1/4¼	1/4½	1/5	1/8¼	1/11	2/4¾	4¾	4½	6¼	6⅛	4 7/16	3¾	108/0	124/0	62/0	64/6	71/0	25/10/0	22/5/0	25/15/0	26/0/0	22/10/0	26/5/0	..	..	..	..
,, 9	..	..	..	..	..	..	4¾	4⅜	6¼	6	4⅜	3⅝	108/0	120/0	62/0	64/6	71/0	25/15/0	23/0/0	26/0/0	..	..	..	..	..	..	..
,, 18	..	..	..	..	..	..	4¾	4⅜	6¼	6	4⅜	3½	108/0	116/0	62/5	64/0	71/0	26/0/0	23/0/0	26/10/0	..	..	26/15/0	..	..	..	..
,, 25	..	..	..	..	..	..	4⅝	4¼	6¼	5 19/16	4⅜	3½	108/0	116/0	62/0	64/6	71/0	27/0/0	25/10/0	28/0/0	..	26/10/0	29/0/0	..	..	..	..

HEMP AND TOW GRADING RETURNS.

APRIL.

Hemp.—The total number of bales graded was 10,143, as compared with 18,620 for the corresponding month of last year, a decrease of 8,477 bales. For the twelve months ending 30th April, 1914, the number of bales graded was 151,772, as compared with 129,993 for the previous twelve months, the increase being 21,779 bales.

Tow.—During the month 2,776 bales were dealt with, as compared with 6,230 for the corresponding month of last year, a decrease of 3,454 bales. For the twelve months ending 30th April, 1914, the number of bales graded was 48,759, as compared with 44,689 for the previous twelve months, an increase of 4,070 bales.

Stripper-slips.—During the month 241 bales were passed for export, as compared with 1,409 for the corresponding month of last year. For the twelve months ending 30th April, 1914, the number of bales graded was 4,943.

HEMP, TOW, AND STRIPPER-SLIPS GRADED THROUGHOUT THE DOMINION DURING THE MONTH OF APRIL 1914.

Hemp.

Port.	Superior.	Fine.	Good-fair.	Fair.		Common.	Rejected.	Condemned.	Total.
				High Point.	Low Point.				
	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	..	272	803	744	175	2	..	1,996
Napier ..	..	..	..	..	..	..	..	..	..
Foxton ..	..	6	880	1,899	552	218	17	..	3,572
Wellington ..	..	17	1,136	1,495	457	42	2	..	3,149
Blenheim ..	..	136	50	..	..	..	..	..	186
Picton ..	..	65	97	68	..	..	..	..	230
Lyttelton ..	..	..	..	..	..	..	..	..	..
Dunedin ..	..	..	102	87	..	..	..	..	189
Bluff	..	..	440	308	60	13	..	..	821
Totals ..	..	224	2,977	4,660	1,813	448	21	..	10,143
Percentages of totals	..	2·21	29·35	45·94	17·87	4·42	0·21	..	..

Tow.

Port.	First Grade.	Second Grade.	Third Grade.	Condemned.	Total.
	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	143	378	74	595
Napier	..	..	..	..	..
Foxton ..	191	507	128	..	826
Wellington ..	133	319	194	8	654
Blenheim ..	37	88	..	..	125
Picton	..	117	..	..	117
Lyttelton ..	..	..	..	..	..
Dunedin ..	..	29	..	..	29
Bluff	32	91	280	27	430
Totals ..	395	1,294	980	109	2,776

Stripper-slips.—Passed for export: Foxton, first grade 48, second grade 24—total, 72; Wellington, second grade 136. Condemned: Wellington, 33.

NEW ZEALAND-SAN FRANCISCO TRADE.

FOLLOWING are the shipments of produce for San Francisco, Tahiti, and Rarotonga, and transhipments for Vancouver from New Zealand, since January last:—

—	"Tahiti," 7th Jan.	"Moana," 30th Jan.	"Aorangi," 27th Feb.	"Tahiti," 27th March.	"Moana," 24th April.
Gum, packages	6	44	16	8	16
Seeds, sacks	184	..	..	34	301
Grain, &c., sacks	148	250	33	48	48
Meat, cases	896	431	1,299	261	223
Onions, cases	5	6	8	11	5
Potatoes, sacks	42	20	25	22	6
Sundries, packages	1,891	469	47	229	144
Butter, boxes	10,819	2,702	9	7	1
Hemp, bales	..	100	131	484	470
Frozen lamb, carcases	502	2	4	4	3
,, mutton, ,,	..	..	..	..	..
,, veal, ,,	..	..	..	94	104
,, beef, quarters	..	..	..	500	..
,, sundries, packages	..	..	..	..	2
Timber, pieces	..	..	..	..	..
Fresh fruit, cases	..	..	698	9	5

NEW ZEALAND-VANCOUVER TRADE.

FOLLOWING are the shipments of produce for Vancouver and North American ports from New Zealand since December last:—

—	"Makura," 24th Dec.	"Niagara," 17th Jan.	"Marama," 14th Feb.	"Makura," 14th March.	"Niagara," 11th April.
Butter, boxes	23,698	20,076	17,406	12,131	9,787
Mutton, carcases	..	1,000	100	25	1,545
Lamb, ,,	10	1,000	..	186	317
Beef, quarters	990	1,933	652	421	354
Veal, carcases	362	877	402	36	20
Frozen sundries, packages	12	..	33	143	114
Wool, bales	6	17	2	104	96
Grass-seeds, beans, &c., sacks	8	42	..	24	262
Hides and skins, sacks, &c.	709	2,083	2,551	1,320	2,062
Onions, cases	..	4,750	2,500	12,026	4,727
Sheep-skins, bales	..	130	161	..	215
Jam, cases	40	135	89	128	110
Sundries, packages	172	1,518	219	99	2,910
Potatoes, crates	..	..	38	..	..
Kauri-gum, packages	330	303	300	328	300
Hemp, bales	13	..	..	..	511
Rabbits, crates	..	..	300	..	..
Timber, pieces	..	3,450	66	2	258
Eggs, cases	20	..	1	..	..
Meats (canned, &c.), cases	7	1,605	30	503	1,762
Fertilizers, sacks	..	..	..	..	..
Fresh fruit, cases	..	..	..	7	1,256

STOCK EXPORTED.

THE following table shows the numbers and descriptions of stock exported from the Dominion during the month of April:—

Port of Shipment.	Horses.			Sheep.			Cattle.			Pigs.		Dogs.		
	To Australia.	To Great Britain.	To Pacific Islands.	To South America.	To Australia.	To Pacific Islands.	To Australia.	To Pacific Islands.	To Montevideo.	To Australia.	To Pacific Islands.	To Australia.	To Pacific Islands.	To London.
Auckland ..	2	..	32	..	..	213	..	34	..	..	39	4	2	..
Gisborne ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Napier ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wellington	5	..	2	6	67	..	..	..	..	..	..	3	..	..
Lyttelton ..	8	..	..	51	..	..	..	..	..	..	..	..	..	..
Dunedin ..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
Bluff ..	7	..	..	70	..	..	..	..	..	..	..	2	..	..
Totals ..	23	..	34	127	67	213	..	34	..	..	39	9	2	..

Auckland also exported 12 crates of fowls to Pacific islands.

Particulars of horses exported: Thoroughbred—4 mares, 5 stallions, 2 geldings; trotting—2 geldings, 1 mare, 1 foal, 2 pony geldings; harness—22 mares, 6 geldings; draught—7 colts, 1 mare, 2 geldings; 1 hack gelding, 1 filly.

STOCK IN QUARANTINE.

THE following stock were received into quarantine during the month of April:—

No.	Description.	Sex.	Port of Origin.	Owner or Agent.	Address.
2	Beagle dogs ..	Female	London ..	J. F. Hayhurst ..	Temuka.
3	,, pups ..	..	Born on voyage	,, ..	,,
1	Collie	Female	London ..	C. F. Hay ..	Wanganui.
3	Collie pups ..	..	Born on voyage	,, ..	,,
1	Collie	Female	London ..	P. Clarke ..	Masterton.
1	Manchester terrier	Male ..	,, ..	T. C. Chamberlain	Auckland.
1	Clumber spaniel ..	Female	,, ..	C. A. Whitney ..	,,